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REPORT

OF THE

Board of Commissioners of Agriculture and Forestry

OF THE

Territory of Hawaii

FOR THE

Biennial Period Ended December 31, 1918

The New Freedom Press
Honolulu, T.H.
1919

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1919

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Plate 1.

Hawaiian Forest on Waianae Mountains, Oahu.
Showing Kukui and Ohia Lehua Types.

REPORT

OF THE

Board of Commissioners of Agriculture and Forestry

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Territory of Hawaii

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Board of Agriculture and Forestry

Report of the Commissioners

Honolulu, Hawaii, December 31, 1918.

Hon. C. J. McCarthy,
Governor of Hawaii,
Honolulu, Hawaii.

Sir: The Board of Commissioners of Agriculture and Forestry has the honor to present herewith its report for the biennial period ended December 31, 1918.

PERSONNEL AND MEETINGS.

During the past two years the personnel of the Board has remained the same as during the previous biennial period and has held thirty-four regular and special meetings and four joint meetings with the Governor for public hearings relating to forest reserves.

PUBLICATIONS.

The following publications have been issued during the biennial period:

DIVISION OF FORESTRY.

Rule IV—Concerning the protection of bird, animal and vegetable life on certain islands of the Territory, July 28, 1917.

Botanical Bulletin No. 4—"The Ohia Lehua Trees of Hawaii," by Joseph F. Rock, August, 1917.

Reprint from The Hawaiian Forester and Agriculturist—"Forestry as Applied in Hawaii," by C. S. Judd. Vol. XV., No. 5, May, 1918.

DIVISION OF ENTOMOLOGY.

Bulletin No. 4—"The Corn Leaf Hopper," by D. T. Fullaway, December 27, 1918.

DIVISION OF PLANT INSPECTION.

Rule I, Amended—Concerning the importation of fruits, plants, etc., June 8, 1918.

Rule III., Amended—Concerning the importation of rice, June 8, 1918.

Rule XIX.—Concerning the introduction of pineapple plants, etc., June 8, 1918.

DIVISION OF ANIMAL INDUSTRY.

Rule X—Concerning anthrax quarantine on Kauai, April 20, 1917.
Rule XI—Concerning anthrax quarantine on Oahu, May 25, 1917.
Rule XII—Concerning anthrax quarantine on Maui, June 13, 1917.
"Regulations Governing the Importation of Live Stock and Other Animals into the Territory of Hawaii." June 8, 1918.

MONTHLY PUBLICATION OF THE BOARD.

Vols. XIV., 1917, and XV., 1918, "The Hawaiian Forester and Agriculturist."

ORGANIZATION.

The Board as now organized consists of four Divisions—Forestry, Entomology, Plant Inspection, and Animal Industry—and under each of these during the past biennial period much efficient work has faithfully been accomplished with direct beneficial results to the Territory.

The Division of Hydrography continued with this Board until March 23, 1917, when by Act 27 of the 1917 Legislature it was transferred together with all materials, equipment, supplies, and appropriations to the Commissioner of Public Lands with whose office the work and objects of the Division were more closely related.

By Act 206 of the 1917 Legislature the Territorial Marketing Division was on July 1, 1917, placed under the control of this Board and operated with us for one year until June 30, 1918, when by Act 25 of the special session of the Legislature of 1918 it was transferred to a special commission. This year was the most successful in the history of the division; 2,239 consignments of different kinds of island products were received and sold for $172,391.76, an increase of $50,878.85 over the previous year's sales; old debts were paid off; a new system of bookkeeping inaugurated; and the workings of the division were improved so that it became of greater service to the producers and small farmers in the Territory.

DIVISION OF FORESTRY.

The work of this division has continued to be chiefly forest protection and forest extension and much progress has been made in these two lines during the past year. A turning point has been reached in forest protection in that the work of setting apart the main forest reserve system has been completed. A fair amount of fencing of forest reserve boundaries to keep out injurious stock has been accomplished and the protective field force of seven forest

rangers has done good work patrolling for forest fires and trespass of all kinds, repairing and building fences, removing stock, participating in tree planting, and taking general care of the protected forest. The underlying motive for forestry in Hawaii is water production and, therefore, in the planting work the greatest attention has been given to reforesting depleted areas on watersheds which supply districts, towns, and communities with their water supply for agricultural and domestic use.

FOREST PROTECTION.

In treating our native forests as water producers it is essential that they be managed as protection forests rather than as producers of wood and timber. Adequate patrol against trespass, fencing against stock, riddance of stock, and reforestation have therefore constituted the main work.

ADMINISTRATIVE FIELD FORCE.

This, in addition to the gangs of tree planters, was increased during the two years to seven forest rangers so that now there are two regularly employed rangers on Kauai, three on Oahu, one on Maui, and one on Hawaii to look out for the forest reserve interests. The addition of three more on Hawaii is desirable.

NEW FOREST RESERVES.

During the past two years the work of setting apart the general forest reserve system was completed by the addition of nine new forest reserves, comprising 44,476 acres, to reserves already set aside. These were the Papapaholahola Spring, Nonou and Puu Ka Pele on Kauai, the Waiahole, Mokuleia and Hauula on Oahu, and the Panaewa, Keauohana, and Olaa on Hawaii. Additions were also made to the Makua-Keaau on Oahu and the Makawao on Maui, as well as minor eliminations for road and exchange purposes. The island of Kahoolawe was also withdrawn as a forest reserve and returned to the jurisdiction of the Land Office where it can be managed to better advantage.

The number of forest reserves in the Territory now amounts to 47 with a net area of 814,926 acres, of which 554,882 acres or 68% is government land.

PROTECTION OF BIRD LIFE.

In carrying out the wishes of the last Legislature as expressed by Act 214 relating to the protection of bird, animal, and vegetable life on certain small coastal islands off Oahu, the Board passed Rule IV of the Division of Forestry which was approved by the Governor on July 28, 1917. Signs were placed on most of the

islands to warn against trespass and in the enforcement of this rule twenty-two offenders have been arrested and sentenced. This has had a salubrious effect against further trespass and the native bird life on these islands has been greatly benefitted by the above action.

FOREST FENCING.

The construction of new fences on forest reserve boundaries during the two years on three main islands amounted to 14.42 miles and by the repairing of 4.21 miles of old fences a total of 18.63 miles of boundary was made stock-proof during the period. During the past fourteen years, since the setting apart of the first forest reserve, a total to date of 58.11 miles of forest reserve boundaries have thus been made impassable to stock, which is the chief enemy of the susceptible native forest.

REMOVAL OF WILD STOCK.

This fencing has been followed up by stock removal from the reserves and from figures obtained, which at least are very conservative, during the biennial period 129 wild cattle, 397 wild pigs and 141 wild goats (exclusive of Kahoolawe) have been eliminated from forest reserves on three of the main islands. Legislation allowing the killing of wild branded cattle on fenced reserves, where the owner is not known, after published notice, is desired.

FOREST FIRES.

The Territory has been singularly fortunate in escaping damage by forest fires during the period in spite of some very dry weather. Only five fires, mostly in grass and brush, occurred, none of which did any considerable damage, due to the vigilance and efforts of our District Fire Warden system which has been kept in working order by many new appointments.

FOREST EXTENSION.

Forest reserve demarcation, boundary fencing, and elimination of stock from forest reserves must be followed up by bringing back a forest cover on depleted areas. This extension of the forest is accomplished by the artificial means of tree planting where nature is not able to overcome the difficulties which oppose natural regeneration.

TREE INTRODUCTION.

The native koa tree has been used extensively in our tree planting work on the reserves with success but in some situations where the soil is not well drained other trees will grow better. The

Division of Forestry is introducing and trying out new trees which are suitable for watershed cover to supplement the native forest and during the past period with the assistance of the Consulting Botanist and others many new trees from the Philippines and elsewhere have been brought in and planted in different places to test their adaptability to this climate.

TREE PROPAGATION AND DISTRIBUTION.

During the biennial period the three distributing nurseries of the Division sent out 651,411 forest, shade, and ornamental trees to homesteaders, agriculturists, army posts, ranchers, and plantations throughout the Territory. On Arbor Day in 1917, 12,111 trees and in 1918, 11,964 trees were distributed for planting on this occasion and much advice and assistance has been rendered in matters pertaining to tree planting.

A new forest nursery has been established on a forest reserve in the Waianae Mountains where a good start has been made in reforesting the rugged hills in this dry region where fresh water is at a premium It is greatly desired to establish several other nurseries in regions where the conservation of water is essential.

TREE PLANTING ON FOREST RESERVES.

Such work has been almost entirely confined to watershed areas and particularly to the water-producing region back of Honolulu. Tree planting has been in operation in five different localities with a total of 44,444 trees set out and cared for. The planting of koa trees in the Makiki Valleys has been continued, all of the vacant government reserve land in Manoa Valley has been reforested mostly with koa, and extensive plantings have been made at Lualualei on Oahu, and at Papapaholahola Spring and Kamalomalo on Kauai.

The results of experimental planting on Haleakala, Maui, show that temperate zone coniferous trees, such as the Jeffrey pine of California do well at an elevation of 6,700 feet with a height growth in eight years of 11 feet and a diameter of 3½ inches. Of 18 different kinds of new Eucalyptus trees set out in Nuuanu Valley the blackbutt shows up best with a yield of 4½ cords per acre after five years of growth.

TREE PLANTING ON PRIVATE LANDS.

Reports which have been turned in show that during the past two years a total of 1,632,598 trees has been planted throughout the Territory mostly on private lands. This is only slightly less than the number planted during the previous two years. The

greater number was planted for purposes of watershed cover followed by planting for fuel production.

MISCELLANEOUS.

Other activities of the Division of Forestry, which have taken secondary place, have been cooperation with the Land Office in rendering assistance on technical forestry questions, establishing a policy and putting into operation a plan for issuing permits for summer camps on the high tableland in the Kauai mountains, the display of an exhibit at the first territorial fair, assisting in the eradication of new plant pests, and issuing publications on forest questions of general interest.

RECOMMENDATIONS.

Now that the work of setting apart forest reserves has been completed and a good start has been made in actual forest administration, it is essential and desired that means be provided to continue and extend this worthy work more particularly by providing for a few additional forest rangers, for the additional fencing of reserve boundaries and for new nurseries and trees planting for the conservation of water.

The report of the Superintendent of Forestry covers in detail the matters here merely outlined and is followed by a list of the Fire Wardens, Forest Rangers, and District Foresters and by reports of the Forest Nurseryman and Consulting Botanist.

DIVISION OF ENTOMOLOGY.

Previous to July 1, 1917, the work of this division fell into two distinct and separate lines, involving separate duties and responsibilities, viz.: 1. True entomological work such as beneficial insect introduction, propagation and distribution and general entomological work and 2, Plant quarantine and inspection work. It seemed best, therefore, to make of this old division two new ones and this was accomplished on July 1, 1917, by authority of Act 66 of the Session Laws of 1917, without increasing the force. The change has worked out very well and greatly to the advantage of the Territory.

The work of the new Division of Entomology has been confined during the period principally to the propagation and distribution of beneficial insects. Unsettled traveling facilities due to the war have made it inadvisable to undertake any new introductions and although the main work has as a consequence been concentrated on the distribution of introductions already made, new projects have at the same time been investigated so that they can be taken up in the field when the opportunity presents itself.

The beneficial insects handled by the division during the two years have been the corn leaf hopper egg parasite, the fruit fly and melon fly parasites, dung fly parasites and others, of which over half a million have been propagated and distributed to control pests in many parts of the Territory. A great deal of benefit has accrued to the rancher and small farmer by assisting nature in this way.

A special study was made by the Entomologist of the corn leaf hopper and its parasites which resulted in an instructive bulletin on the subject. The effectiveness of these parasites is proved by the high amount of parasitism secured which has averaged close to fifty per cent.

Fortunately, no new pests of any moment appeared during the biennial period but since the appearance of a really dangerous new insect is not an impossibility, it is well to be prepared for emergencies and to have available sufficient funds with which to combat it by every means known to science.

DIVISION OF PLANT INSPECTION.

The work of this new division has been greatly strengthened and facilitated by separating it from the other activities of the old Division of Entomology which has made it possible to concentrate on the important work of fruit and plant inspection and quarantine at the waterfront. This reorganization which took place on July 1, 1917, was followed by the erection of a suitable and substantial concrete building on land set aside by the Governor on Kekuanaoa Street, Honolulu, which contains the offices of the inspectors, plant and quarantine room, laboratory, incinerator, and library. This is supplemented by two airtight concrete fumigating units which are constantly used to rid shipments of pests. These buildings were first occupied at the end of 1917, and all old equipment which was scattered on the various wharves was assembled in this new location. Since then, all work pertaining to the inspection of plants has been carried on with greater safety at this new station.

IMPORTATION INSPECTION.

As in previous years, the main activities of this division have consisted of inspecting at Honolulu all fruits, vegetables, plants, and seeds in the attempt to prevent the introduction of new pests from foreign countries and the movement of pests from Honolulu, the port of entry, to ports on the other islands. The work in Honolulu has been supplemented by inspections at Hilo and Kahului. During the two years 1,433 vessels arriving at these three ports from foreign and mainland ports were given attention. Of these, 614 vessels carried vegetable matter consisting of 566,268 packages

of fruit and vegetables, seeds, and plants. Of these, over 7,000 packages were either burned, fumigated before delivery, or returned to the shipper on account of being infested with insect pests or fungus diseases or being contraband under the rulings of the Federal Horticultural Board.

INTER-ISLAND INSPECTION.

During the period under review 1,396 steamers plying between Honolulu and other island ports received attention, and of the 24,114 packages of plants, fruits, and vegetables inspected, 330 packages were rejected on account of infestation or having undesirable soil attached to the roots of plants.

RULES AND REGULATIONS.

The rules and regulations pertaining to the shipment of plants, fruits, seeds, etc., from the mainland and foreign countries and pertaining to rice shipments from Japan were amended so as to make them more stringent and a new rule was passed to prohibit the importation of pineapple plants and suckers from the West Indies and Central America in the effort to keep out a pineapple beetle which does serious damage to pineapples in Jamaica.

COOPERATION.

The work of the division has been greatly facilitated by the cooperative assistance rendered by the post office and customs officials in allowing the inspection and destruction of prohibited plants, etc., and by the Federal Horticultural Board which imposes restrictive measures on horticultural imports which have given greater security against the danger of introducing foreign insect pests and plant diseases.

The continuation of plant inspection work is of the utmost importance to the agricultural interests in the Territory and an adequate appropriation for its maintenance on an efficient basis is respectfully requested.

DIVISION OF ANIMAL INDUSTRY.

The most noteworthy achievements of this division during the past two years were the successful suppression of an outbreak of anthrax on three of the islands and the progress made toward the total eradication of bovine tuberculosis from the Territory. Both of these diseases are transmissible to man, and for this particular reason the special efforts of the territorial veterinarians were directed toward their suppression. Both of these achievements have been made possible by special appropriations of the Legislature which have been most timely. Beyond anthrax and bovine

tuberculosis the Territory has been singularly free from animal diseases of any kind during the biennial period and the rigid inspection that is made of all imported live stock has continued to keep out obnoxious animal diseases which are rampant elsewhere.

LIVE STOCK CONDITIONS IN GENERAL.

The development of mule breeding in the Territory, especially on the Parker Ranch, has met with such signal success that it should be unnecessary in the future to import the heavier mules required for wagons and field plowing and cultivation on the plantations.

The beef cattle industry is also established on a sound basis so that the islands are self supporting in this respect but an entirely too limited number of breeding stock for dairy purposes has been imported to make the necessary improvement that is required to prevent the dairy industry of the Territory from going to pieces.

Hog raising has improved steadily both as to quality and quantity and this industry can now take care of the local demand.

The sheep industry is gradually being crowded out by cattle raising and poultry and eggs are imported in steadily increasing quantities due to the high cost of imported feed.

The importations of horses, pure bred cattle and sheep have increased during the period under review while the importations of mules and of swine have fallen off considerably.

RULES AND REGULATIONS.

In order to keep up to date with recent legislation enacted by Congress and the various states pertaining to livestock in interstate and foreign trade the regulations of this division governing the importation of live stock and other animals into the Territory were revised and upon approval by the Governor went into effect on June 8, 1918.

On July 28, 1917, Rule VII pertaining to the transfer of hogs from Oahu to other islands was rescinded for the reason that it was no longer considered necessary, hog cholera not having appeared on Oahu for more than a year.

Rules X, XI and XII placing a quarantine on the islands of Kauai, Oahu, and Maui, respectively, were promulgated during the summer of 1917 on account of the anthrax epidemics. The first still remains in force with certain modifications.

Rule XIII requiring a permit to keep Belgian hares and other rabbits was promulgated on October 30, 1917, to comply with Act 50 of the Session Laws of 1917.

THE ANTHRAX OUTBREAKS.

Anthrax, hitherto unknown in the Territory, and which could have been only introduced maliciously, made its first appearanec on Kauai in April, 1917, followed by an outbreak on Oahu in May, and several outbreaks on Maui in June. It fortunately was prevented from reaching Hawaii. The prompt action of the Legislature then in session in providing liberal means wherewith to fight the outbreaks contributed to the effectiveness with which the epidemics were combatted. On Kauai and Oahu the disease was confined by stringent quarantine measures to the premises where it first made its appearance and the outbreaks on Maui were similarly confined though widely scattered.

On Oahu the United States Army rendered generous aid by furnishing guards for the quarantined area and on Kauai the County government rendered liberal support. The prompt action of the division in securing a supply of serum vaccine with which all exposed animals were vaccinated, the quarantine of all pastures in the region of infection, and the disposal of all carcasses by cremation were effective in confining the loss to less than five hundred head of cattle and horse stock and brought the epidemy to a complete standstill on Oahu and Maui before the fall of the same year. In the infected district on Kauai only two cases have occurred in 1918 and the last one of these more than seven months ago.

Since the infection may remain in the soil for years, the preventive measure of vaccination and constant vigilance must be continued on Kauai for an indefinite period and an appropriation for these measures is required.

BOVINE TUBERCULOSIS CONTROL.

The campaign for the eradication of bovine tuberculosis in the dairy herds of the Territory was continued with good results during the period under review and was greatly aided by the indemnification act passed by the last Legislature. Less tuberculosis was found in those dairies known to be heavily infected than at any time in their previous history and by the liberal compensation to owners of condemned animals the opposition of dairy owners has subsided so that the prospects of complete eradication can be said to have come within reach.

Under the authority of Act 121 of the Session Laws of 1917, 9,577 head of cattle were tested and 453, found to be affected with tuberculosis, were condemned. These were appraised at an aggregate of $40,265, and after slaughter and inspection the wholesome parts of the carcasses were sold for $17,674.66. The owners con-

sequently received on the average $83.76 per head for such condemned animals.

Altogether this law has given general satisfaction and has materially aided the dairymen in their efforts to clean up their herds by removing infected animals which have been a menace to the healthy animals in the herd and which were unprofitable milk producers and which either were or might become at any time dangerous to human beings.

A few minor improvements in the present law, based on the experience of the past two years are desired, and it may be expected that with a smaller appropriation during the coming biennial period together with what federal aid is forthcoming the continuation of the tuberculosis eradication work will see the end of the infection in the Territory.

CONCLUSION.

In concluding this report, the Commissioners desire to lay emphasis on the efficient work which has been performed for the benefit of the Territory at large by the several Divisions, the reports of which follow herewith in detail. It is confidently hoped that the Board and its four Divisions will receive adequate support, both financially and otherwise, for the continuation of these important lines of work.

Respectfully submitted,

A. H. RICE, President.
W. M. GIFFARD.
J. M. DOWSETT.
H. M. vonHOLT.
A. L. C. ATKINSON.
Commissioners.

STATEMENT OF BALANCES ON HAND DECEMBER 31, 1916.

Appropriations—1914-1916.

GENERAL FUND.

Balance on hand, December 31, 1916			**$101,040.34**
Expended January 1, 1917, to June 30, 1917.			
Board of Administration:			
Wages	$3,036.00		
Expenses	3,795.57		
		$6,831.57	
Division of Forestry:			
Wages	$10,087.40		
Expenses	4,554.51		
		$14,641.91	
Division of Entomology:			
Wages	$6,301.46		
Expenses	1,815.31		
		$8,116.77	
Division of Animal Industry:			
Wages	$5,880.00		
Expenses	2,824.75		
		$8,704.75	
Territorial Marketing Division:			
Wages and Expenses		$5,961.49	
Glenwood Experimental Station:			
Wages and Expenses	$1,780.25		
Traveling Expenses	361.60		
		$2,141.85	
Division of Hydrography:			
Wages	$2,556.21		
Expenses	832.49		
		$3,388.70	
Total expended			49,787.04
Balance June 30, 1917			$51,253.30
Control, Suppression and Eradication of Anthrax,			
Special Appropriation made April 27, 1917		$25,000.00	
Expenses		6,362.54	
			$18,637.46

BOARD OF AGRICULTURE AND FORESTRY.

(Appropriations by Legislature of 1917.)

Board of Administration:			
Salary, Executive Officer and Superintendent of Forestry		$8,400.00	
Expended 18 months to Dec. 31, 1918		6,300.00	
Unexpended balance, Dec. 31, 1918			$2,100.00
Salaries and Wages, employees		9,840.00	
Expended, 18 months to Dec. 31, 1918		7,207.50	
Unexpended balance, Dec. 31, 1918			$2,632.50
Expenses		5,520.00	
Expended 18 months to Dec. 31, 1918		3,976.03	
Unexpended balance, Dec. 31, 1918			$1,543.97

Division of Forestry:		
Salary, Forest Nurseryman	4,440.00	
Expended 18 months to Dec. 31, 1918	3,330.00	
Unexpended balance, Dec. 31, 1918		$1,110.00
Rangers and Nursery Agents, Hilo	9,240.00	
Expended 18 months to Dec. 31, 1918	5,610.00	
Unexpended balance, Dec. 31, 1918		$3,630.00
Wages of laborers	31,600.00	
Expended 18 months to Dec. 31, 1918	17,553.94	
Unexpended balance, Dec. 31, 1918		14,046.06
Expenses	20,000.00	
Expended 18 months to Dec. 31, 1918	11,937.79	
Unexpended balance, Dec. 31, 1918		8,062.21
Division of Entomology:		
Salary, Entomologist	6,000.00	
Expended 18 months to Dec. 31, 1918	4,500.00	
Unexpended balance to Dec. 31, 1918		1,500.00
Salaries, Assistants	3,480.00	
Expended 18 months to Dec. 31, 1918	1,745.00	
Unexpended balance, Dec. 31, 1918		1,735.00
Expenses	5,000.00	
Expended 18 months to Dec. 31, 1918	1,424.79	
Unexpended balance, Dec. 31, 1918		3,575.21
Collecting and Introducing Parasites		10,000.00
Division of Plant Inspection:		
Salary, Chief Plant Inspector	6,000.00	
Expended, 18 months to Dec. 31, 1918	4,500.00	
Unexpended balance Dec. 31, 1918		1,500.00
Salaries, Inspectors	11,400.00	
Expended, 18 months to Dec. 31, 1918	7,976.29	
Unexpended balance Dec. 31, 1918		3,423.71
Expenses	5,000.00	
Expended, 18 months to Dec. 31, 1918	2,782.84	
Unexpended balance Dec. 31, 1918		2,217.16
Division of Animal Industry:		
Salary, Territorial Veterinarian	6,000.00	
Expended, 18 months to Dec. 31, 1918	4,500.00	
Unexpended balance Dec. 31, 1918		1,500.00
Salary, Asst. Territorial Veterinarian	4,800.00	
Expended, 18 months to Dec. 31, 1918	3,600.00	
Unexpended balance Dec. 31, 1918		1,200.00
Salary, Livestock Inspector	3,120.00	
Expended, 18 months to Dec. 31, 1918	2,340.00	
Unexpended balance Dec. 31, 1918		780.00

Salaries, Deputy Veterinarians and Caretakers, Quarantine Stations	10,080.00	
Expended, 18 months to Dec. 31, 1918	7,380.00	
Unexpended balance Dec. 31, 1918		2,700.00
Expenses	8,000.00	
Expended, 18 months to Dec. 31, 1918	6,695.70	
Unexpended balance Dec. 31, 1918		1,304.30
Glenwood Experiment Station:		
Salary, Superintendent	3,600.00	
Expended, 18 months to Dec. 31, 1918	2,700.00	
Unexpended balance Dec. 31, 1918		900.00
Expenses and Assistants	2,400.00	
Expended, 18 months to Dec. 31, 1918	1,905.03	
Unexpended balance Dec. 31, 1918		494.97
Traveling Expenses, Superintendent	1,200.00	
Expended, 18 months to Dec. 31, 1918	902.11	
Unexpended balance Dec. 31, 1918		297.89
Territorial Marketing Division:		
Salary, Superintendent	6,000.00	
Expended, 12 mos. to June 30, 1918	2,163.97	
Unexpended balance June 30, 1918		3,836.03
Salaries and Expenses	24,000.00	
Expended, 12 mos. to June 30, 1918	11,640.93	
Unexpended balance June 30, 1918		12,359.07
Food Crop Production	5,000.00	
Expenses, 12 mos. to June 30, 1918	2,348.35	
Unexpended balance June 30, 1918		2,651.65
Control, Suppression and Eradication of Anthrax,		
Special appropriation made April 27, 1917	25,000.00	
Expended to Dec. 30, 1918	24,999.54	
Unexpended balance Dec. 31, 1918		.46
Control, Suppression and Eradication of Anthrax,		
Special appropriation made May 31, 1918	1,757.11	
Expended June, 1918	1,757.11	
To Prevent, Suppress and Eradicate Bovine Tuberculosis, Special appropriation made April 23, 1917	20,000.00	
Expended to Dec. 31, 1918	15,972.38	
Unexpended balance Dec. 31, 1918		4,027.62
Preservation, Extension Forestry and Forest Reserves:		
Balance on hand December 31, 1916	3,572.50	
Receipts to Dec. 31, 1918	658.25	
		4,230.75
Expended to Dec. 31, 1918		19.46
Balance on Deposit Dec. 31, 1918		4,211.29

DETAILS OF EXPENDITURES.
January 1, 1917, to December 31, 1918.

	1917 6 mos. Jan. 1, to June 30, 1917	1917 6 mos. July 1, to Dec. 31, 1917	1918 12 mos. Jan. 1, to Dec. 31, 1918	18 mos. July 1, '17 to Dec. 31, 1918	Total 24 mos. Jan. 1, '17 to Dec. 31, 1918
Board of Administration:					
Salaries and Wages:					
Executive Officer	$ 600.00				$ 600.00
Executive Officer and Supt. of Forestry		$2,100.00	$4,200.00	$ 6,300.00	6,300.0
Salaries and Wages, employees	2,436.00	2,438.25	4,874.25	7,312.50	9,748.50
	$3,036.00	$4,538.25	$9,074.25	$13,612.50	$16,648.50
Expenses:					
Routine	$ 765.35	$ 179.13	$ 340.34	$ 519.47	$1,284.82
Supplies	998.79	1,107.45	1,094.71	2,202.20	3,200.99
Transportation	24.75	20.00	40.50	60.50	85.25
Publications	1,792.47	8.00	226.40	234.40	2,026.87
Maintenance of Building	214.21	144.55	814.91	959.46	1,173.67
	$3,795.57	$1,459.17	$2,516.86	$3,976.03	$7,771.60
Division of Forestry:					
Salaries and Wages:					
Superintendent of Forestry	$1,500.00				$1,500.00
Assistants and Employees	8,587.40				8,587.40
Forest Nurseryman		$1,110.00	$2,220.00	$3,330.00	3,330.00
Rangers and Nursery Agents		1,690.00	3,920.00	5,610.00	5,610.00
Wages of Laborers		5,566.69	11,987.25	17,553.94	17,553.94
	$10,087.40	$8,366.69	$18,127.25	$26,493.94	$36,581.34

Expenses:					
Routine	$1,816.88	$1,644.18	$ 757.78	$2,401.96	$4,218.84
Transportation	1,385.11	616.79	2,330.10	2,946.89	4,332.00
Publications	217.17	1,346.05	459.66	1,805.71	2,022.88
Supplies	39.52		352.39	352.39	391.91
Planting		58.85	1,033.65	1,092.50	1,092.50
Fencing	1,095.83	65.75	3,098.09	3,163.84	4,259.67
Maintenance of Building			125.00	125.00	125.00
Forest Fires		49.50		49.50	49.50
	$4,554.51	$3,781.12	$8,156.67	$11,937.79	$16,492.30
Division of Entomology:					
Salaries and Wages:					
Superintendent of Entomology	$1,500.00				$1,500.00
Parasitic Work	$1,500.00	1,500.00	3,000.00	4,500.00	6,000.00
Assistants and Employees	3,301.46	395.00	1,350.00	1,745.00	5,046.46
	$6,301.46	$1,895.00	$4,350.00	$6,345.00	$12,546.46
Expenses:					
Insectary	$ 247.98	$ 12.50	$ 206.45	$ 218.95	$ 466.93
Supplies	393.87	111.57	115.28	226.85	620.72
Transportation	383.90	10.00	650.31	660.31	1,044.21
Publications	789.56	35.66	283.02	318.68	1,108.24
	$1,815.31	$ 169.73	$1,255.06	$1,424.79	$3,240.10
Division of Plant Inspection:					
Salaries and Wages:					
Plant Inspector		$1,500.00	$3,000.00	$4,500.00	$4,500.00
Salaries, Inspectors		2,651.29	5,325.00	7,976.29	7,976.29
		$4,151.29	$8,325.00	$12,476.29	$12,476.29
Expenses:					
Routine		$ 124.80	$ 113.34	$ 238.14	238.14
Supplies		382.76	227.64	610.40	610.40
Publications			153.63	153.63	153.63
Transportation		164.50	345.66	510.16	510.16
Maintenance of Building			1,270.51	1,270.51	1,270.51

Division of Animal Industry:					
Salaries and Wages:					
Territorial Veterinarian	$1,500.00	$1,500.00	$3,000.00	$4,500.00	$6,000.00
Assistants and Employees	4,380.00				4,380.00
Assistant Territorial Veterinarian		1,200.00	2,400.00	3,600.00	3,600.00
Livestock Inspector		780.00	1,560.00	2,340.00	2,340.00
Deputy Ter. Veterinarians and Caretakers, Quarantine Stations		2,490.00	4,890.00	7,380.00	7,380.00
	$5,880.00	$5,970.00	$11,850.00	$17,820.00	$23,700.00
Expenses:					
Quarantine Station	$ 502.12	$1,210.63	$1,153.84	$2,364.47	$2,366.59
Supplies	$ 779.58	113.70	1,054.11	1,167.81	1,947.39
Transportation	1,543.05	194.85	2,500.74	2,695.59	4,238.64
Incidentals		139.50	52.34	191.84	191.84
Publications		66.95	209.04	275.99	275.99
	$2,824.75	$1,725.63	$4,970.07	$6,695.70	$9,520.45
Glenwood Experimental Station:					
Salaries, Wages and Expenses:					
Salary, Superintendent		$ 900.00	$1,800.00	$2,700.00	$2,700.00
Assistants and expenses	1,780.25	579.82	1,325.18	1,905.00	3,685.25
Traveling Expenses	361.60	227.02	675.09	902.11	1,263.71
	$2,141.85	$1,706.84	$3,800.27	$5,507.11	$7,648.96
Control, Suppression and Eradication of Anthrax	$6,362.54	$17,360.75	$1,276.25		$24,999.54
	$6,362.54	$17,360.75	$1,276.25		$24,999.54

	Jan. 1, 1917 to March 31, 1917	Jan. 1, 1917 to March 31, 1917
Division of Hydrography:		
Salaries and Wages:		
Stream Gaging	$1,112.23	$1,112.23
Rain Gaging	105.00	105.00
Reports, Compiling, Computing	945.93	945.93
General Office Expenses	269.70	269.70
General Supervision	79.35	79.35
Labor	44.00	44.00
	$2,556.21	$2,556.21
Expenses:		
General Office Expense	$173.26	$173.26
Subsistence, Persons, etc.	189.05	189.05
Travel Charges	220.56	220.56
Equipment, permanent	25.95	25.95
Supplies, expendable	70.66	70.66
Incidentals	117.46	117.46
Freight	35.55	35.55
	$ 832.49	$832.49

Division of Forestry

REPORT OF THE SUPERINTENDENT OF FORESTRY

Honolulu, Hawaii, December 31, 1918.

The Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1917 and 1918.

INTRODUCTION.

The main activities of the Division during the past two years have been largely confined to the two important branches of forest work—protection and extension. The details of this work and what has been accomplished are set forth in the following pages.

The main underlying motive for the practice of forestry in these islands is the maintenance by forest influences of a continued and steady supply of water for the use of agricultural and domestic pursuits in the Territory. The protection and rehabilitation of the forest, therefore, for the beneficial effect which it exerts on the water supply, rather than the exploitation of the forest for timber, are striven for, and any factors which work against these main objects are detrimental to the best interests and welfare of the Territory.

The sooner this principle is understood and universally practiced by all owners of forest land in the Territory, the sooner will be attained the ultimate object of forestry in these islands. This is essential because of the intimate manner in which forest lands under different ownerships are intermingled on the several islands.

Fortunately during the past year one of the leading factors in the control of such lands, the Hawaiian Sugar Planters' Association, has seen fit to undertake the actual practice of forest protection and reforestation on forest lands under its control by estab-

lishing a Division of Forestry in its organization and by beginning work on the first unit in the Kohala Mountains. Deserved credit for the institution of this work is assigned to Commissioner W. M. Giffard, who prepared last summer a very able paper on the methods of organization for such work. The Division of Forestry of this Board will cooperate in whatever work is done by the Association wherever government forest reserve lands are involved.

In private work of this character, the Territory, represented by this Board, is more than willing to meet the private owner half-way in working out the details for any project and will gladly cooperate in any fencing project, in the employing of a ranger for mutual protection and patrol, and in nursery and reforestation projects, where government forest lands are situated on the same watershed requiring attention.

In the actual practice of forest work throughout the Territory during the past two years, several conclusions have been reached by the present incumbent at the head of the Division of Forestry which may be elucidated here. A large part of the executive work in connection not only with the demarcation of new forest reserves, which work, as will be seen later, has just been brought to a conclusion, but also with their actual field administration requires technical skill through personal effort. The simple tasks of fence repairing, driving out cattle and planting trees can be accomplished by the ordinary ranger or laborer, but the type of man at present available cannot be expected to plan and execute jobs, such as the proper selection of new nursery sites, etc., which require higher technical ability. Such work has therefore devolved upon the personal efforts of the only trained forester in this Division, and with a field of over half a million acres scattered over five different islands and separated by 360 miles of ocean and difficult land travel, not as much has been accomplished as is desired. The addition of one other technical man on the present force would make it possible to accomplish considerably more that awaits attention.

Because of the greater publicity given to the demarcation of new forest reserves through the calling of public hearings and publication of proclamations, the impression has obtained with some that this has constituted the chief work of the Division and that, when once a reserve is established on paper, further work ceases. This has been far from the truth, although in some cases it has not been possible to perform certain complete work, such as fencing, because of the disinclination of the adjacent private owner to cooperate or because of lack of adequate appropriation, or because the land under an old lease has not yet reverted to the government. It is always the plan to follow the proclamation of a new

FOREST RESERVES
ISLAND OF KAUAI
Territory of Hawaii
Jan. 1919
Scale 1 in. = 40,000 ft
No.
Names
Haleleа
Keahua
Na Pali Kona
Lihue-Koloa
Moloaa
Papapahohahola
Nonou
Puu Ka Pele
KOKEE
NA PALI
HALELEA
KOOLAU
PUNA
Prepared by Civil Survey Dept. 1919

Biennial Report, 1918, Board of Agriculture and Forestry. Map 1.

reserve as speedily as possible with the necessary fencing and protection and large areas of established forest reserve lands are far from being mere paper reserves, for they are properly fenced and patrolled by rangers against trespass by man and beast, stock has been removed, and open areas have been reforested. The work of actual forest reserve administration has progressed at the same time with the establishment of new reserves.

During the past period of fourteen years since the setting apart of the first reserve, there have been constructed, through the efforts of the Division of Forestry so far as funds have permitted and through the cooperation of private owners and the Land Office by means of fencing clauses in general leases, a total of 40.26 miles of new stock-proof fences on government forest reserve boundaries and 17.85 miles of existing fences have been repaired, making a total to date of 58.11 miles of boundary made impassable to stock. Through cooperation with local residents hundreds of wild cattle, pigs and goats have been removed from forest reserve lands. Hundreds of acres of open land in the reserves have been replanted and at present there is a force of seven government forest rangers on active duty on these reserves patrolling for forest fires and trespass of all kinds, repairing old and building new fences, removing stock, planting trees and taking general care of the protected forest.

In the planting work the greatest attention has been given to reforesting areas which are on the watersheds supplying cities and communities with their domestic water supply as, for example, the Honolulu Watershed where in Nuuanu, Makiki, and Manoa Valleys large areas have been planted up to trees to maintain a continuous and assured flow of water for the city mains through the surface supply and artesian basins and for the cultivation of the important native food, taro.

In the planting work, it is not the number of trees that are actually set out that counts but the number of trees which through constant care and diligent and frequent weedings and cultivation are brought to such a state that their growth will no longer be hindered by rank grasses or weeds. This is the aim in all tree planting work done by the Division of Forestry.

FOREST PROTECTION.

ADMINISTRATIVE FIELD FORCE.

Increased protection has been given to forest reserve lands during the past two years by the appointment of an additional ranger on the island of Kauai and through certain changes in the personnel of the force. Ranger Kaina D. Lovell died on June 20, 1917, and was succeeded on August 1, by his son, Hosea K. Lovell as Forest Ranger for windward Kauai. On September 1, 1918,

W. V. Hardy was appointed Forest Ranger for Kauai in general and more particularly for the Waimea District. The three rangers for Oahu and one for Maui have remained the same with the exception of the additional appointment of Bruce Cartwright Jr. on August 1, 1917, as Honorary Forest Ranger for the enforcement of Rule IV of this Division on Oahu. On June 20, 1917, Ranger F. B. Dodge left our services to enlist in the navy and he was succeeded on September 28, 1917, by A. J. W. Mackenzie, who was appointed Forest Ranger for South Hawaii. These men have done good work in their respective districts in all lines of forest activity.

Now that the setting apart of the general forest reserve system has been accomplished, it will be possible to give greater impetus to the work of forest protection and extension in the form of fence building and tree planting. The services of two additional rangers for the Districts of Kau and Kona combined and for North Hilo, respectively, and of a ranger for the Kohala region in cooperation with the H. S. P. A. could be used to good advantage.

NEW FOREST RESERVES.

During the past two years the work of examining, describing, and setting apart forest reserves in the Territory, the essential first step in forest administration, was completed by the addition of nine new forest reserves comprising 44,476 acres, to the general reserve system, making a total of 47 reserves now established on the main islands throughout the group. These new forest reserves are as follows:

The Papapaholahola Spring Reserve in Kalaheo, Kona, Kauai, consisting of 54 acres of government land about the spring which supplies local residents with their water and most of which has already been planted up to trees by the Division of Forestry.

The Nōnou Forest Reserve in Wailua, Puna, Kauai, consisting of 818 acres of government land on the ridge which parallels the coast and which is important for the conservation of water.

The Puu Ka Pele Forest Reserve in Waimea, Kauai, consisting of 4,900 acres of government land, which includes the scenic part of the Waimea Canyon and a large area of upland which is coming up to koa trees and is well worth protecting.

The Waiahole Forest Reserve in Koolaupoko, Oahu, consisting of 1,169 acres of which 96.5% is government land, which is important as a water-producing forest in that it embraces forest land which is a part of the Waiahole water tunnel system.

The Mokuleia Forest Reserve in Waialua, Oahu, consisting of 6,290 acres of government land above the private grants on the higher northern slopes of the Waianae Mountains which drain to

Plate 2.

Standard Forest Reserve Metal Monument and Fence, Waiahole, Oahu.

the lower agricultural lands below where banana, rice, and sugar cane crops are irrigated by the 21 artesian wells which are supplied with water from this forested area.

The Hauula Forest Reserve, Koolauloa, Oahu, consisting of 9,193 acres, of which 12.4% is government land. This includes the government land of Hauula and the large privately owned valleys of Kaluanui, Punaluu and Kahana, which are heavily forested and are important as water producers.

The Panaewa Forest Reserve in South Hilo, Hawaii, consisting of 1,750 acres of government ohia forest extending from 4½ Miles out from Hilo along the Volcano Road to the Puna line.

The Keauohana Forest Reserve in Puna, Hawaii, consisting of 272 acres of government land bearing one of the most picturesque ohia forests on the famous drive to Kalapana.

The Olaa Forest Reserve in Puna, Hawaii, consisting of 20,030 acres of government land in the heavy wet forest of ohia, olapa, koa, loulu palms and tree ferns where homesteading has been unsuccessful and which has an important meteorological influence on the adjacent cane lands on the slopes below.

In addition to these nine new reserves, an area of 104 acres of government land was added to the Makua-Keaau Forest Reserve in Waianae, Oahu, and 263 acres of government land were added to the Makawao Forest Reserve in Hamakuapoko, Maui. On April 20, 1918, for reasons given elsewhere in this report, the island of Kahoolawe comprising 28,260 acres was withdrawn from the forest reserve and returned to the jurisdiction of the Land Commissioner and several minor withdrawals of a few acres were made for government road and exchange purposes.

The total number of forest reserves throughout the Territory is now 47, with a total area of 814,926 acres, of which 554,842 acres or 68% is government land. These are listed in the following table:

FOREST RESERVES, TERRITORY OF HAWAII.

January 1, 1919.

Name.	No.	District.	Total Area Recommended to be Reserved, Acres.	Area Government Land, Acres.	Area Private Land, Acres.	Date of Proclamation.
ISLAND OF KAUAI.						
Halelea	6	Halelea	37,500	10,990	26,510	Aug. 24, 1914
Kealia	5	Puna	9,935	7,385	2,550	Mar. 9, 1906
Na Pali Kona	13	Na Pali and Kona	60,540	40,650	19,890	June 12, 1907
Lihue-Koloa	19	Puna and Kona	29,260	13,365	15,895	June 5, 1909
Moloaa	20	Koolau	5,621	3,578	2,043	June 5, 1909
Papapaholahola Spring	41	Kona	54	54		June 19, 1918
Nonou	44	Puna	818	818		Dec. 31, 1918
Puu Ka Pele	45	Waimea	4,900	4,900		Dec. 31, 1918
			148,628	81,740	66,888	
ISLAND OF OAHU.						
Kaipapau	1	Koolauloa	913	913		Nov. 10, 1904
Ewa	7	Ewa, Waianae and Waialua	28,550	5,151	23,399	Mar. 9, 1906
Waianae-kai	10	Waianae	3,653	3,546	107	Sept. 7, 1906
Lualualei	11	Waianae	3,743	3,743		Nov. 30, 1906
Pupukea	21	Koolauloa	864	864		May 10, 1910
Nanakuli	28	Waialua	1,010	1,010		June 4, 1913
Makua-Keaau	29	Waialua	*4,820	4,480	340	June 4, 1913
Kuaokala	30	Waialua	434	434		June .., 1913
Honolulu Watershed	34	Honolulu	6,950	4,998	1,952	Oct. 13, 1913
Kuliouou	35	Honolulu	214	214		Feb. 13, 1914
Manoa Ranger Station	38	Honolulu	15	15		May 9, 1916
Round Top	39	Honolulu	115	115		Aug. 10, 1916
Waiahole	42	Koolaupoko	1,169	1,129	40	June 19, 1918
Mokuleia	46	Waialua	6,290	6,290		Dec. 31, 1918
Hauula	47	Koolauloa	9,193	1,143	8,050	Dec. 31, 1918

ISLAND OF MOLOKAI.						
Molokai	26		44,674	13,268	31,406	Aug. 25, 1910
ISLAND OF MAUI.						
Koolau	4	Koolau and Hamakualoa	42,969	30,230	12,739	Aug. 24, 1905
Hana	12	Hana	14,825	13,767	1,058	Nov. 30, 1906
West Maui	14	Lahaina, Kaanapali and Wailuku	44,482	19,147	25,335	Apl. 21, 1908
Makawao	15	Hamakuapoko	†2,093	2,093		Apr. 21, 1908
Waihou Spring	18	Hamakuapoko	84	74	10	June 5, 1909
Kula	27	Kula	6,075	5,069	1,006	Sept. 11, 1912
Kipahulu	36	Kipahulu and Kaupo	10,600	4,600	6,000	Aug. 20, 1914
			121,128	74,980	46,148	
ISLAND OF HAWAII.						
Hamakua Pali	2	Hamakua	18,940	16,333	2,607	Dec. 23, 1904
Hilo	3	Hilo	110,000	60,223	49,777	July 24, 1905
Honuaula	8	Kona	665	665		Apr. 4, 1906
Kau	9	Kau	66,066	59,811	6,255	Aug. 2, 1906
Waiaha Spring	16	Kona	193	193		Apr. 21, 1908
Mauna Kea	17	Hamakua	66,600	66,600		June 5, 1909
Hauola	22	Hamakua	7	7		June 13, 1910
South Kona	24	Kona and Kau	36,952	29,260	7,692	May 17, 1911
Puna	25	Puna	19,850	19,850		June 29, 1911
Kohala Mt.	31	N. and S. Kohala	29,627	14,204	15,423	Oct. 13, 1913
Upper Waiakea	32	Hilo	51,800	51,800		Oct. 13, 1913
Upper Olaa	33	Puna	9,280	9,280		Oct. 13, 1913
Olaa Forest Park	37	Puna	531	531		Aug. 20, 1914
Panaewa	40	South Hilo	1,750	1,750		Apr. 11, 1917
Keauohana	43	Puna	272	272		June 19, 1918
Olaa	48	Puna	20,030	20,030		Dec. 31, 1918
			432,563	350,809	81,754	
TOTAL		ALL ISLANDS	814,926	554,842 (68%)	260,084 (32%)	

*Boundary modified and area enlarged from 4,716 to 4,820 by proclamation of Governor McCarthy, Dec. 31, 1918.
†Boundary modified and area enlarged from 1,830 to 2,093 by proclamation of Governor Pinkham, June 19, 1918.

RULES AND REGULATIONS.

The rules and regulations for the protection and administration of forest reserve lands, already in force, have worked out so well that it has not been found necessary to add to them by the promulgation of any new rule. Under Rule II many permits have been issued to legitimize certain uses in forest lands, such as hunting wild game, which it was believed could be granted with due regard for the main purpose for which the reserves were created. The only arrests under our regulations were made by the police in February and March, 1918, when two men were apprehended for trespassing on the watershed in Nuuanu Valley in violation of Rule III. Each was fined $10 and costs.

PROTECTION OF BIRD LIFE.

Owing to depredations committed on certain small islands off the windward coast of Oahu, in which wild sea birds were killed for their feathers and their nests robbed of eggs, the 1917 Legislature passed Act 214 which gave this Board power to promulgate and enforce all necessary rules and regulations for the protection of bird, animal and vegetable life on the islands of Moku Manu, Moku Lua, Popoia, Manana, Kaohikaipu, Mokuhooniki and Kapapa. This Board accordingly on July 20, 1917, passed Rule IV of the Division of Forestry which was approved by the Governor on July 28, 1917, and went into effect immediately.

DIVISION OF FORESTRY.

RULE IV.

The Board of Commissioners of Agriculture and Forestry hereby make the following rule and regulation for the protection of bird, animal and vegetable life on certain islands of the Territory of Hawaii.

Section 1. It is unlawful for any person to hunt, trap, capture, wilfully disturb or kill any bird or any animal of any kind whatever, or to take, injure or destroy the eggs of any bird, or to cut, chop, burn, injure or destroy any vegetation on the islands of Moku Manu, Moku Lua, Popoia, Manana, Kaohikaipu, Mokuhooniki and Kapapa, except as authorized by written permit from the Superintendent of Forestry.

Section 2. The going on or being on said islands with intent to destroy, molest, disturb, or injure any bird, animal or vegetable life thereon without a written permit from the Superintendent of Forestry is forbidden and declared to constitute trespass punishable by fine.

Section 3. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars ($500.00), as provided by Section 529, Revised Laws of Hawaii of 1915.

This rule shall take effect upon its approval by the Governor of Hawaii.

Approved this 28th day of July, 1917.

LUCIUS E. PINKHAM,
Governor of Hawaii.

Honolulu, Territory of Hawaii.

FOREST RESERVES
ISLAND OF OAHU
Territory of Hawaii
Jan. 1919
Scale 1 in = 40,000 ft
N
S
WAIANAE
WAIANAE UKA
WAIALUA
EWA
KOOLAU
KOOLAU
No.
Names
1 Kaipapau
2 Ewa
3 Waianae-Kai
4 Lualualei
5 Pupukea
6 Nanakuli
7 Makua-Keaau
8 Kuaokala
9 Honolulu Watershed
10 Kulioou
11 Manoa Ranger Station
12 Round Top
13 Waiahole
14 Mokuleia
15 Honuula
Prepared by Govt. Survey Dept. 1918

The birds consisting largely of the petrel and frigate bird which nest on these small rocky islands are sea scavengers and may therefore be considered beneficial, and for this reason it is desirable to protect them. Quadrupeds are found on only two of the islands, the indigenous rat on Popoia off Kawailoa, Kailua, and wild rabbits on Manana off Makapuu Point. Moku Manu and Manana are most extensively populated by birds and only the migratory plover is found on Kaohikaipu off Makapuu and on Kapapa in Kaneohe Bay.

To enforce this rule and warn offenders against trespass, cloth and tin signs were made and posted on points along the Oahu coast where departures are usually made for these islands, and substantial wooden painted signs were placed somewhat at the risk of human life, on Kapapa, Popoia, Manana and the two islands of Moku Lua. An attempt was made to land on Moku Manu off Mokapu Point for the same purpose but had to be abandoned on account of engine trouble and the high sea that was running, and as yet there has been no opportunity to reach Mokuhooniki, which is off the eastern end of Molokai.

At the same time with the promulgation of Rule IV. Mr Bruce Cartwright, Jr., was appointed Honorary Forest Ranger to assist in the enforcement of this rule and in his interest in the protection of bird life he has rendered valuable assistance in bringing violators to justice. Mr. J. F. G. Stokes of the Bishop Museum has also rendered timely aid by supplying valuable information concerning bird habits and the use of his boat for posting signs.

In the enforcement of this rule there have been twenty-two arrests and convictions and these have had a very wholesome effect in preventing further trespass. In March, 1918, on information supplied to the police by Ranger Cartwright, 13 chauffeurs were arrested for going to Manana and killing rabbits without a permit and for robbing nests of eggs and molesting the birds which breed there. All pleaded guilty and were given a thirteen months' suspended sentence. In June of the same year, nine other people from Honolulu made an unauthorized visit to the same island and committed similar depredations. They were arrested by the police on the following day and upon appearance in the police court pleaded guilty and each was given a suspended sentence of 13 months.

FOREST FENCING.

The work of protecting forest reserve boundaries by fencing has progressed during the past two years as rapidly as attention could be given it. In most cases a personal examination of the boundary to determine just where the fence should be constructed and the amount of material required is necessary, and where pri-

vate land is involved negotiations must be made with the owner for cooperative fencing. Owing to the nature of the land short stretches of fence across a valley or over a ridge will protect large areas further back on the mountains and so far as possible the lines of new forest reserve boundaries have been laid out so that natural barriers, impassable to stock, are taken advantage of. In addition to the construction of new fences, attention has been given as well to the repairing of existing fences, for in this manner stock can effectively be kept out of a forest at comparatively small expense and a fence is not worth much unless it is stockproof.

The anthrax outbreaks which required my personal attention for several months during 1917 interfered somewhat with the fencing program. Many of the boundaries to be fenced are situated in out of the way places where it is hard to transport the posts and wire and where labor is scarce and hard to obtain, but it was found possible through the efforts of this Division and cooperation with private owners and the Land Office to construct during the biennial period 14.42 miles of new fence and repair 4.21 miles of existing fences on forest reserve boundaries, making a total of 18.63 miles of boundary adequately protected by the necessary stockproof fences.

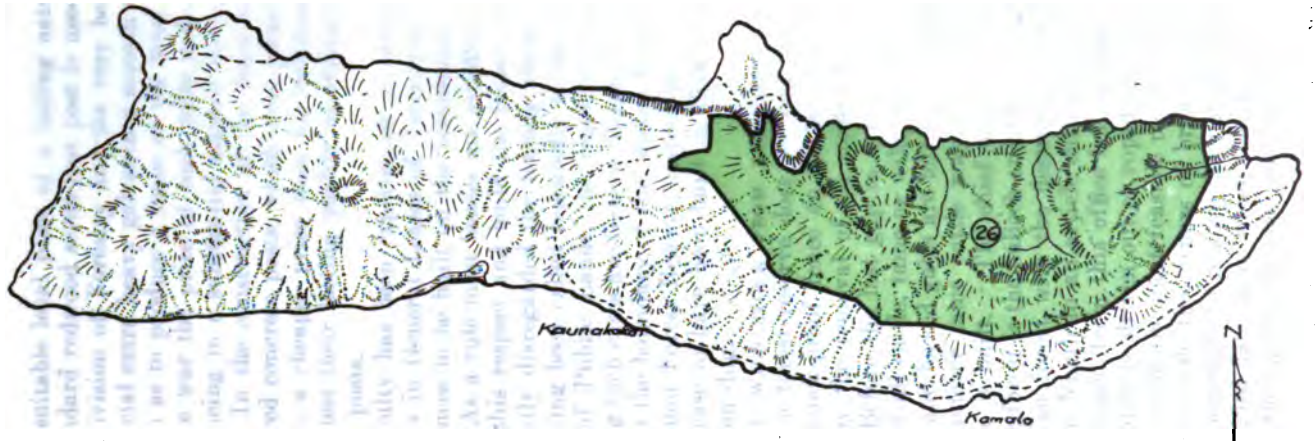
The fencing work in detail during the past two years was as follows:

FENCES CONSTRUCTED, 1917-1918.

Date Completed.	Island.	Reserve.	Location	Length (miles)
May, 1917	Oahu	Honolulu Watershed	Makiki	.08
Sept., 1917	Hawaii	Olaa Forest Park	Olaa	.48
Nov., 1917	Oahu	Nanakuli	Nanakuli	1.35
Dec., 1917	Hawaii	Hilo	Laupahoehoe	2.78
May, 1918	Hawaii	Hilo	Piha	3.42
July, 1918	Oahu	Waianae-kai	Waianae	.22
Aug., 1918	Maui	Makawao	Makawao	.89
Sept., 1918	Oahu	Waiahole	Waiahole	.59
Sept., 1918	Oahu	Hauula	Hauula	1.05
Dec., 1918	Hawaii	Olaa Forest Park	Glenwood	3.56
			Total	14.42

FENCES REPAIRED, 1917-1918.

Date Completed.	Island.	Reserve.	Location	Length (miles)
April, 1917	Oahu	Honolulu Watershed	Nuuanu	.37
June, 1918	Oahu	Pupukea	Pupukea	1.19
Aug., 1918	Maui	Makawao	Makawao	.53
Nov., 1918	Maui	Makawao	Olinda	1.31
Dec., 1918	Oahu	Waiahole	Waiahole	.81
			Total	4.21



FOREST RESERVE

ISLAND OF MOLOKAI

Territory of Hawaii

Jan. 1919

Scale 1 in. = 30,000 ft.

No	Name
26	Molokai

Prepared by Gov't. Survey Dept. 1917

Biennial Report, 1918, Board of Agriculture and Forestry.

Map III.

As a rule, where suitable local posts of a lasting nature are not obtainable, the standard redwood seven-foot post is used in all fencing work of the Division of Forestry and the very best wire obtainable, a No. 6 special extra heavy galvanized smooth wire, is strung to these posts so as to produce a fence of the most lasting character. During the war the price of such posts and of wire has doubled so that fencing in a substantial manner now costs at least $500 per mile. In the construction of the fence at Glenwood, Hawaii, reenforced concrete posts, which were picked up in Hilo for 60 cents each, a cheaper price than for redwood posts, were used in order to test their lasting quality as compared with the locally grown ohia posts.

Considerable difficulty has been experienced in securing the fulfillment of covenants in General Leases of Territorial grazing lands which require fences to be built on the boundaries of adjacent forest reserves. As a rule most lessees are mindful of their solemn obligations in this respect and build the fences promptly, but a few have flagrantly disregarded the fencing clause and, in spite of the matter having been called repeatedly to the attention of the Commissioner of Public Lands, the required fences still remain unbilt. Among such cases are General Leases No. 730 and 837, in which fences on the boundary of the Makua-Keaau Forest Reserve and the Kuliouou Forest Reserve, respectively, on Oahu, were required by the lease to have been built in 1914, but as yet not a post hole has been dug.

REMOVAL OF WILD STOCK FROM RESERVES.

The protection of a forest reserve does not end, however, in the construction of a stock-proof fence on its boundaries. This must be followed up by the removal of all stock which still remain in the forest. Before the last gap in a boundary fence is built a drive is made of all cattle, tame or wild, which can be removed in this manner, and locked gates are left at strategic points for the removal of whatever tame cattle may inadvertently get through after the fence is built. The chief enemy of our indigenous water-producing forest is the bullock and the damage which he does to our Hawaiian forest with the destructive results that follow were discussed at length in an article entitled "Forestry as Applied in Hawaii"* issued from this office last spring. Tame cattle as a rule can readily be driven out or roped and led out but when they have become wild the most feasible method of removal is in gunny sacks. As a rule the owners of branded wild cattle have been given an opportunity to remove their stock from forest reserve lands by a specified date, after which the Division has felt free to remove them in the manner deemed most advisable. In this

*The Hawaiian Forester and Agriculturist, Vol. XV, No. 5, May, 1918.

way a considerable amount of wild stock has been eliminated from forest reserves. Where the owner of branded wild cattle is unknown, or cannot be located, more difficulty may be encountered and legislation to authorize the killing of such cattle, without compensation, but after published notice, is desirable.

Since the hunting of wild animals on a forest reserve, except as authorized by permit from the Superintendent of Forestry, by Rule II constitutes trespass punishable by a fine, permits have readily been issued to responsible parties to shoot cattle, when the way is clear, and pigs and goats in the reserves on the several islands. Complete returns on the number of wild animals killed in this manner are not obtainable but from the reports which have reached this office through the rangers and otherwise, it is certain that during the past two years at least 129 wild cattle, 397 wild pigs and 141 wild goats (exclusive of Kahoolawe) have been shot or killed on or removed from government lands in forest reserves on Kauai, Oahu, and Hawaii. A condition is included in each permit requiring that as full use as possible be made of the meat of such animals, and in this manner the forest reserves have helped out considerably in the food supply.

FOREST FIRES.

During the past two years, in spite of some unfavorable weather conditions, we were fortunate in having no serious forest fires which did any extensive damage, and only a few grass fires, the dates and localities of which were as follows:

June 25, 1917.—Ewa Forest Reserve, Oahu. A fire which started from smoking out a bee tree spread at 11 a.m. on the military reservation of Waianae-uka on the South Fork of the Kaukonahua River and burned over about 50 acres of grass land and ferns with a few clumps of trees before it was gotten under control by nightfall through the efforts of two troops of the Fourth Cavalry and 90 prisoners of war.

August 19, 1917.—Maili Ridge, Oahu. A small grass fire started on the Leilehua plateau, but was extinguished the same day by U. S. troops.

August 28, 1917.—Piihonua, near Hilo, Hawaii. A fire escaped from a Hawaiian burning brush and burned over about 50 acres of open and scrub forest land. Laborers from nearby plantations under the direction of Fire Warden John A. Scott succeeded in getting the fire under control after a few days' work.

September 16, 1917.—Waikapu Valley, Maui. A fire burned over 10 acres of waste land covered with pili grass and lantana, but was extinguished in a few hours.

Plate 3.

Popoia, One of the Small Bird Islands off Oahu Protected by Rule IV.

November 9, 1918.—Ewa Forest Reserve, Oahu. A grass and brush fire occurred from causes unknown on the same area on the military reservation as the fire of June 25, 1917. About 25 acres were burned over before it was extinguished in two hours by a troop of cavalry assisted by a shower of rain.

During the dry period of 1917 new cloth fire warning notices were printed and distributed to the District Fire Wardens, who posted them at conspicuous points where fires were apt to occur.

In August, 1917, the menace of homesteaders' clearing fires and the dry condition of the woods at Laupahoehoe, Hawaii, made it advisable to appoint Mr. H. S. Rickard as Assistant Fire Warden and he rendered valuable services in preventing many small forest fires in this region. A number of new Fire Wardens were appointed throughout the Territory to take the place of those who had either died, resigned, or moved away from their districts.

A revised list of District Fire Wardens, together with the District Foresters, who look out for the interests of forestry in general, is presented at the end of this report.

FOREST EXTENSION.

The official setting apart of forest reserves, the fencing of their boundaries where necessary, and the elimination of stock must be followed up with the reestablishment of the forest cover by artificial means wherever it has been so badly depleted that it will not come back naturally. This is accomplished by planting trees. In this work the native koa and other indigenous trees have largely been used, but attempts have been made as well to obtain new species which will be suitable for covering our watersheds.

TREE INTRODUCTION.

We must naturally turn to all parts of the tropical world for new species, and a variety of new trees have been introduced by the Division during the past two years not only to determine which are suitable as watershed cover to supplement our native forest but which will produce valuable timber on areas where water conservation is not a factor. In this work of tree introduction Consulting Botanist Mr. J. F. Rock has been of material assistance. In April, 1917, 37 trees of 20 different species of trees which he brought from the Philippines were planted out on Tantalus in order that they might serve as a future source of seed for distribution throughout the Territory. These are important timber trees of the Philippine Islands which are profuse seeders and which probably will be suitable for watershed protection. They were permanently staked out and tagged so as to retain their identity. The

Consulting Botanist also supplied this Division with a quantity of seed of the Sau Tree, *Albizzia moluccana* from British North Borneo. This is a very rapidly growing tree which is already showing up very well with us.

Experiments with the growing of the Benguet pine, *Pinus insularis*, which we have raised from seed sent to us by the Director of Forestry at Manila, P.I., have proved that it will not grow to any size at our lower levels, but does very well at elevations of 6,000 feet on Hawaii. The seed of the Molave, *Vitex parviflora* which he has also sent have germinated well, and show good promise of succeeding here.

The Australian red cedars, *Cedrela australis*, introduced in 1916 and distributed to 22 different places in the islands, are doing remarkably well and in some localities have grown at the rapid rate of 11 feet in 15 months.

In August 1917, 39 different species of eucalypts, acacias, and other Australian trees raised from seed secured by Mrs. C. C. Kennedy and kindly presented to this Division were planted out on the Manoa Ranger Station to test their adaptability to the region.

During the same month two boxes of New Zealand trees were received from Hon. E. Mitchelson of Auckland and a part were set out on the Manoa Ranger Station. Among these are the kauri pine, rimu or red pine, *Dacrydium cupressinum*, and other important trees of New Zealand.

From trees growing in Honolulu we have obtained seed of the gum arabic, *Acacia arabica* and khair, *Acacia catechu*, and have raised young trees for distribution. These are two valuable Indian trees which are suitable for planting in the drier parts of these islands. Seedlings of the logwood have been similarly handled.

A supply of seed of the karaka tree, *Corynocarpus laevigata* was secured from the 1918 crop at Halemanu, Kauai, and distributed to forest rangers and inhabitants of the higher elevations on Maui and Hawaii for planting. Several pounds were also donated to the H. S. P. A. for use in their new forestry operations.

TREE PROPAGATION AND DISTRIBUTION.

The nurseries for the propagation and distribution of trees have continued to be maintained at Honolulu, Homestead, Kauai, and Hilo, Hawaii, and have done good service in supplying homesteaders, agriculturists, inhabitants of army posts, ranchers, and plantations throughout the Territory with forest, shade and ornamental trees. The total number of trees so distributed fell about a quarter of a million short of the number sent out during the previous two years but amounted to 651,411 trees. Shortage of labor for tree planting operations partly accounted for this de-

Plate 4.

Repairing Forest Reserve Boundary Fence at Lualualei, Oahu.

crease. Further details of this work are given in the report of the Forest Nurseryman.

ARBOR DAY.

Arbor Day as usual was celebrated in 1917 on November 16 and in 1918 on November 22. This is participated in mostly by school children whom we have attempted to assist in the beautification of their school grounds not only by furnishing them with trees for planting free of cost but also with advice as to their care and protection.

The numbers of trees distributed from the government nurseries for planting on Arbor Day during the last two years were as follows:

Nurseries	1917	1918	Total
Government Nursery, Honolulu	10,490	10,500	20,990
Sub-Nursery, Homestead, Kauai	1,287	1,125	2,412
Sub-nursery, Hilo, Hawaii	334	339	673
Total	12,111	11,964	24,075

This distribution is about 5,000 trees less each year than the average annual tree distribution during the past twelve years.

NEW FOREST NURSERY.

During July 1918, as a step in the extension of tree planting work on the forest reserves, a new nursery was established in the Lualualei Forest Reserve on the west slope of the Waianae Mountains, Oahu, just below Kolekole Pass. A small house for the accommodation of laborers was constructed and water was piped to the house and nursery terraces from the nearby perennial stream. Most of the seedlings are started in the Makiki Nursery and shipped down in seed boxes to this new nursery where they are transplanted and held until of sufficient size for planting out. The planting gang of Hawaiian laborers which in May 1918 had completed the reforestation of all open government forest reserve lands in Manoa Valley was shifted to this new locality where the forest cover should be reestablished because of the benefit which it will exert on the valuable springs and small streams in this comparatively dry region. This site was also selected because of the opportunity which it presents for testing out the trees which are best suited to the drier situations in these islands and for obtaining knowledge and experience along this line which at present are lacking.

A similar expansion of reforestation work is desirable at other places in the islands and it is hoped that sufficient funds will be available to permit the establishment of new nurseries with their accompaniment of tree planters on the Kula Forest Reserve, Maui, the Mokuleia Reserve, Oahu, and at Piihonua on the Hilo Watershed, Hawaii.

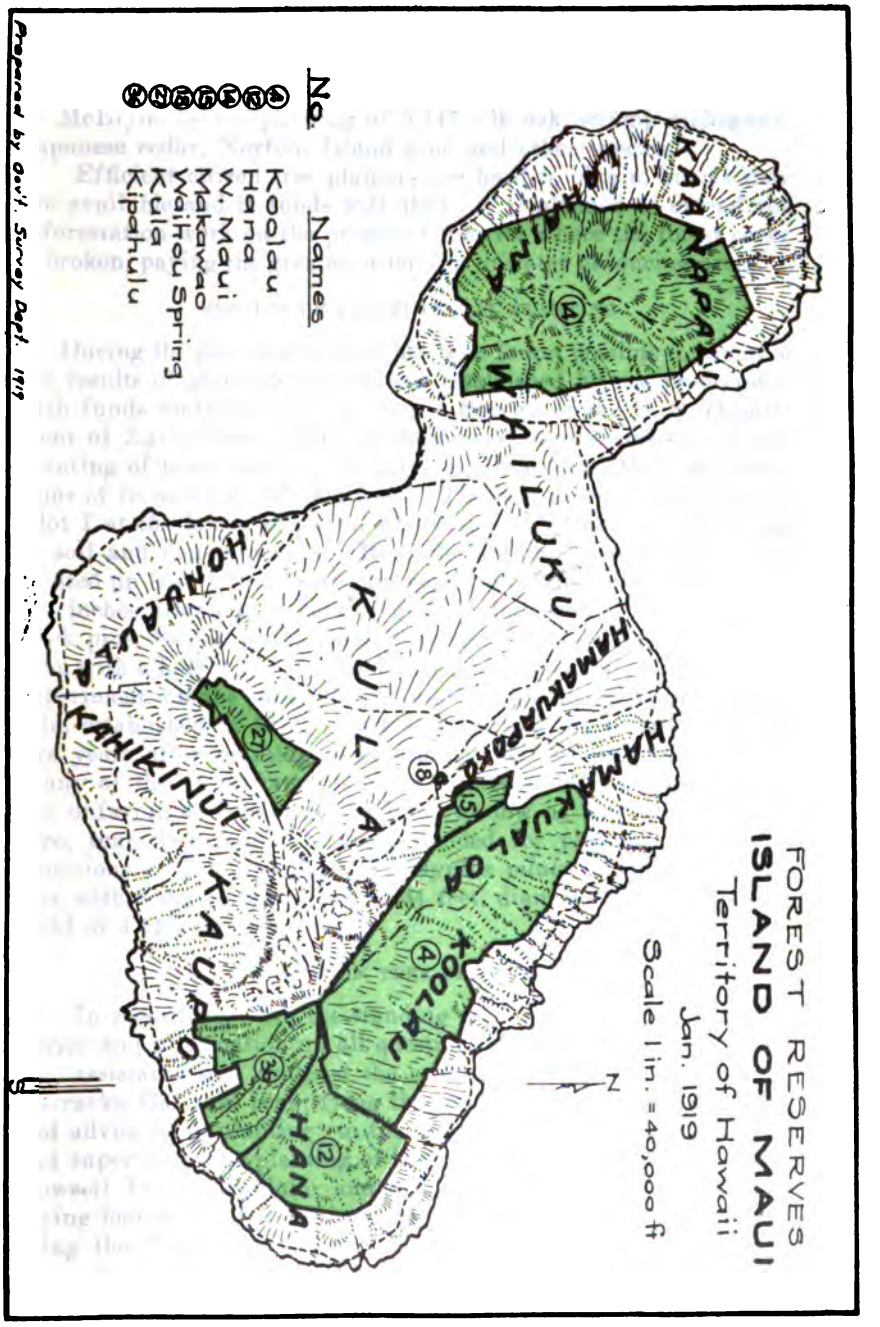
TREE PLANTING ON FOREST RESERVES.

The tree planting work done by the Division of Forestry during the past two years has been confined almost wholly to watershed areas and particularly to the water-producing region back of Honolulu, for it is only from a completely forested watershed that the best results in the way of an even and continuous flow of water can be obtained. The operations of the Division have extended over five different regions and a total of 44,444 trees have been planted and cared for on forest reserves at Makiki and Tantalus, Manoa, and Lualualei on Oahu and at the Papapaholahola Spring and Kamalomaloo on Kauai. In this planting, in addition to the miscellaneous species listed below, a total of 21,138 koa trees were set out. This native tree is used in the belief that it is quite suited to planting on situations where there is a well drained soil and that it forms a good cover since it allows native shrubs and ferns to come up in its shade. The koa responds readily to nursery treatment and the only difficulty which we have had is the inability to secure seed in large quantities because of an insect which riddles the pods before the seed is even ripe.

On the Honolulu Watershed Forest Reserve, Oahu, the reforestation of the open places in the Makiki Valleys, begun in 1913, was continued by the planting out of 8,796 koa on the slopes and 3,304 trees of various species at the lower ends of the valley bottoms. Among the latter were 1,484 mahogany and 686 yellow poinciana trees which were planted 8 by 8 feet apart in December, 1917, and May, 1918, respectively, to test their growth under close planting conditions. The koa trees which were first planted on Sugar Loaf are now five years old and constitute a healthy forest with a complete crown canopy. On this same reserve all of the open government lands in Manoa Valley were reforested in the sixteen months ended May, 1918. On approximately 63 acres there were set out 8,516 koa trees and 5,011 trees of other species among which were Australian tea trees, papala kepau, African tulip, banyan, Australian red cedar, sau tree, Japanese cedar, silk oak, Cook pine and Benguet pine.

On the Lualualei Forest Reserve, Oahu, the planting which began in July, 1918, included a total of 5,304 trees among which were 3,826 koa and the following dry region trees: wiliwili, gum arabic, black locust, yellow poinciana, kassod and logwood. On a part of the Pupukea Forest Reserve, Oahu, 2,934 trees of various species were set out under contract in December, 1918, on water Reserve A. by Libby, McNeill & Libby on land which had formerly been cultivated in pineapples.

On Kauai, the planting work was continued on the Kealia Reserve by Ranger Lovell by the setting out of 5,232 trees consist-



Prepared by Gov't. Survey Dept. 1919

ing of silk oak, swamp mahogany, lemon gum, ironwood, and Japanese cedar and on the Papapaholahola Spring Reserve near Kalaheo by two laborers working under the direction of Mr. W. D. McBryde by the planting of 5,347 silk oak, swamp mahogany, Japanese cedar, Norfolk Island pine and other species.

Efficient citizen tree planters are hard to obtain, but as they are available and if funds will allow, it is planned to extend the reforestation work on the protected reserves where the forest cover is broken, paying the greatest attention to water producing areas.

RESULTS OF EXPERIMENTAL PLANTING.

During the past two years it has been found possible to examine the results of planting experiments established by my predecessor with funds contributed by the Forest Service of the U. S. Department of Agriculture. One of these experiments consisted of the planting of temperate zone conifers on Haleakala, Maui, at elevations of from 6,700 to 9,000 feet. The best growth was found in Plot I at the lowest elevation where more favorable conditions as to soil and moisture exist. Here the Jeffrey pine of California showed up best with a maximum height of 11 feet and diameter of 3½ inches after eight years of growth, followed by Coulter pine, Jack pine, Scotch pine, Norway spruce, incense cedar, and white pine with a height of 5 feet and a diameter of one inch. The other experiment was the eucalyptus plantation in Nuuanu Valley, Honolulu, established in 1911, in which all of the trees were measured five years after planting to determine their growth and volume. Many of the 18 different kinds of eucalypts did so poorly under the unfavorable conditions, yielding as low as only .12 cord per acre, that they cannot be recommended for planting in similar situations. The Blackbutt, *Eucalyptus pilularis,* showed up the best with a maximum height of 34 feet, diameter of 6 inches and yield of 4.51 cords per acre.

ADVICE ON TREE PLANTING.

In accordance with the standing offer of the Division to give advice and information on all questions connected with tree planting, assistance was rendered the commanding officer at Schofield Barracks, Oahu, in beautifying the reservation by furnishing trees and advice as to planting; to the Dowsett Company in furnishing and supervising the planting of koa trees on the new streets in the Dowsett Tract, Honolulu; and to the Oahu Country Club in supplying hau and willow cuttings, and koa and other trees for beautifying the Nuuanu golf links. Advice in tree planting has also been given by the Forest Nurseryman to many others who have called upon this Division for assistance.

TREE PLANTING ON PRIVATE LANDS.

In order to keep track of the general progress of forestry in the Territory reply post cards are sent out each year to all tree planters with the request that they return the number and species of trees planted and the purpose of planting. These figures, while not complete, because all tree planters cannot be reached, are analyzed and the results published every two years. For the biennial period just ended the total number of trees planted, as shown in the list which follows, was 1,632,598. This is only 171,130 trees short of the number planted in 1915 and 1916.

NUMBER OF TREES PLANTED IN THE TERRITORY OF HAWAII in 1917 and 1918.

KAUAI.

	1917	1918	Total
Gay and Robinson	1,500	3,205	4,705
Grove Farm Plantation	20,000	21,500	41,500
Hawaiian Sugar Co.	40,000	20,000	60,000
Isenberg, Rev. Hans	50		50
Kekaha Sugar Co.	505		505
Kilauea Sugar Plantation Co.	11,250	5,500	16,750
Knudsen Bros.	6,300	40,200	46,500
Lihue Ranch	4,278		4,278
Makee Sugar Co.	10,543	8,250	18,793
McBryde Sugar Co.	9,459	4,593	14,052
Territory of Hawaii	6,784	3,795	10,579
	110,669	107,043	217,712

OAHU.

Cooke, Mrs. C. M.	300	1,230	1,530
Dowsett Company	381		381
Ewa Plantation Co.		247	247
Hawaiian Pineapple Co.	4,000	9,000	13,000
Hawaii Preserving Co.	6,000	3,000	9,000
Honolulu Plantation Co.	20,110		20,110
Judd, Mrs. A. H. B.	200		200
Kahuku Plantation Co.		5,000	5,000
Kemoo Farm	100		100
Koolau Agricultural Co.	500		500
Kunia Development Co.	500		500
Laie Plantation	1,154	300	1,454
Marconi Wireless Tel. Co.	600		600
Sandwich Islands Honey Co.	17,000	20,000	37,000
Territory of Hawaii	18,065	15,800	33,865
United States Army	5,500	6,994	12,494
Wahiawa Water Co.	15,200	1,000	16,200
Waialua Agricultural Co.	70,801	78,712	149,513
	160,411	141,283	301,694

	1917	1918	Total
MOLOKAI.			
Baldwin Home	50		50
LANAI.			
Lanai Company	1,912	406	2,318
MAUI.			
Baldwin, Mrs. H. A.	1,600	650	2,250
East Maui Irrigation Co.	200		200
Grove Ranch	1,000		1,000
Haleakala Ranch	915	9,734	10,649
Hawaiian Comm. & Sugar Co.	1,400	1,000	2,400
Honolua Ranch	12,050	24,000	36,050
Krauss, Mr. F. G.	423	73	496
Maui Agricultural Co.	425,000	400,950	825,950
Pioneer Mill Co.	5,060	8,000	13,060
Wailuku Sugar Co.	10,700	20,923	31,623
	458,348	465,330	923,678
HAWAII.			
Gamalielson, Mr. J. E.	52		52
Greenwell, Mr. F. R.	1,000		1,000
Hakalau Plantation Co.	542		542
Hamakua Mill Co.	32,260	15,000	47,260
Hawaiian Agricultural Co.	9,591	9,185	18,776
Hawaii Consolidated R. R.	100		100
Hawi Mill and Plantation Co.	5,875	1,660	7,535
Homesteaders		6,188	6,188
Honokaa Sugar Co.	10,000		10,000
Hutchinson Sugar Plantation Co.		740	740
Kaiwiki Sugar Co.	200		200
Kohala Sugar Co.	12,000	5,000	17,000
Niulii Mill and Plantation	1,200	3,000	4,200
Onomea Sugar Co.		500	500
Paauhau Sugar Plantation Co.	2,000	8,000	10,000
Pacific Sugar Mill	10,000		10,000
Parker Ranch	39,689	11,710	51,399
Puakea Plantation Co.	500	1,000	1,500
Vieira, Mr. J. S.	44		44
Waiakea Mill Co.	110		110
	125,163	61,983	187,146
Total for all islands	856,553	776,045	1,632,598

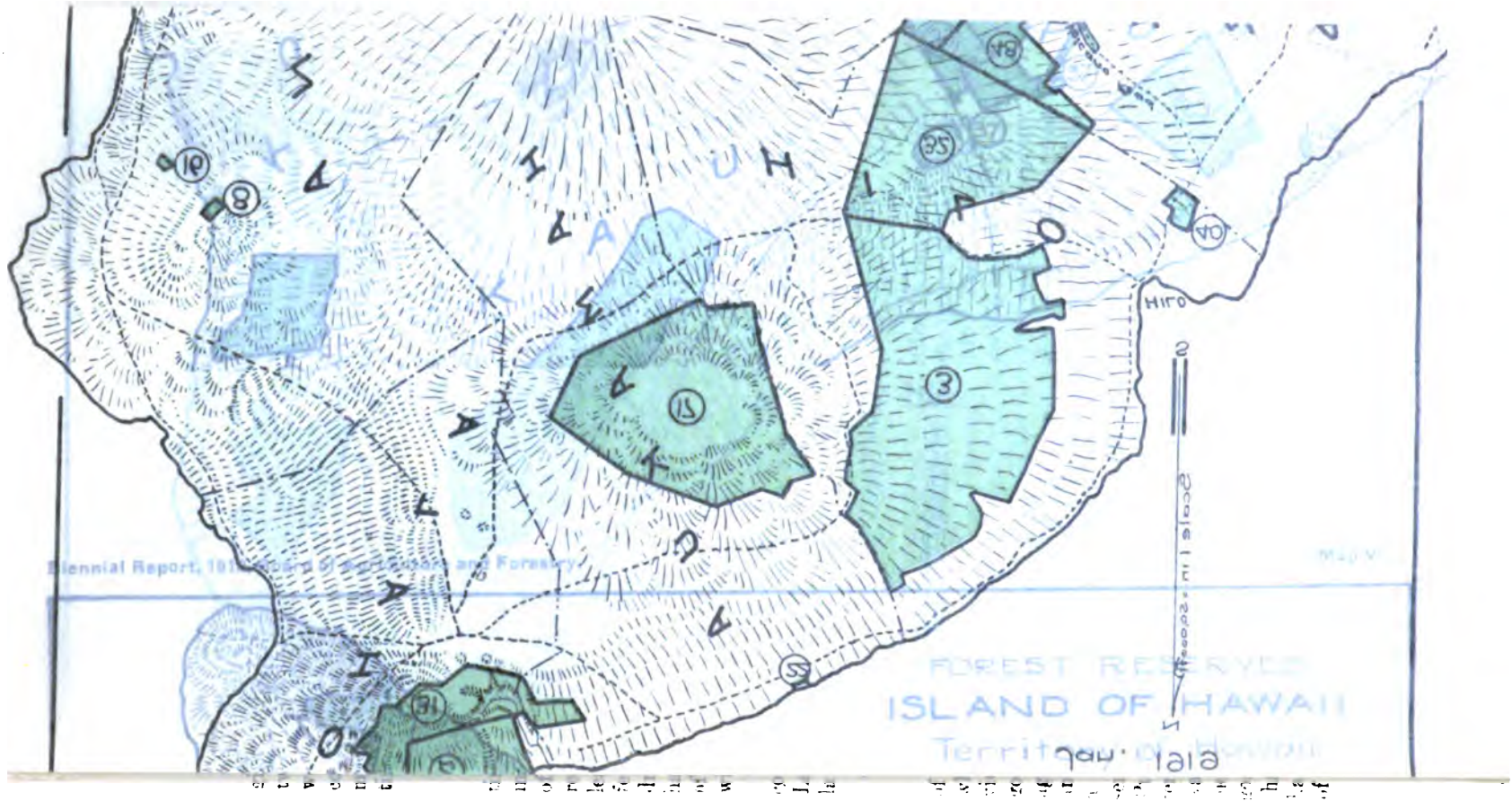
The leading species planted and the purpose of planting are given in the following table:

NUMBER OF TREES PLANTED IN THE TERRITORY OF HAWAII IN 1917 AND 1918 BY SPECIES AND PURPOSE OF PLANTING.

Species	Cover	Fuel	Wind-break	Orna-ment	Timber	Total
			Purpose of Planting.			
			1917			
Swamp mahogany	385,743	79,519	8,081	25,600	900	499,843
Ironwood	.....	60,604	53,900	20,520	.....	135,024
Eucalptus spp.	.....	26,116	44,604	.....	15,000	85,720
Blue gum	.....	42,000	3,000	450	2,500	47,950
Algaroba	.....	20,590	.....	.....	.....	20,590
Other spp.	2,547	.....	60	7,514	5,557	15,678
Lemon gum	15,000	172	.....	.....	.....	15,172
Silk oak	4,833	9,894	.....	.....	.....	14,727
Koa	12,656	.....	.....	272	.....	12,028
Japanese cedar	.....	.....	.....	.....	8,921	8,921
Totals	420,779	238,895	109,645	54,356	32,878	856,553
			1918			
Swamp mahogany	285,837	23,172	17,895	16,000	.....	342,904
Blue gum	149,358	9,000	.....	.....	.....	158,358
Ironwood	1,313	73,821	51,455	10,000	.....	136,589
Red gum	13,800	38,515	18,794	.....	.....	71,109
Other spp.	6,676	.....	1,000	24,327	.....	32,003
Lemon gum	12,000	2,278	.....	.....	.....	14,278
Koa	8,482	.....	.....	.....	.....	8,482
Eucalptus spp.	.....	5,248	175	400	.....	5,823
Silk oak	1,910	756	.....	700	.....	3,366
Algaroba	.....	818	2,075	200	.....	3,093
Japanese cedar	.....	.....	.....	.....	40	40
Totals	479,376	153,608	91,394	51,627	40	776,045

From the above it will be observed that the swamp mahogany, *Eucalyptus robusta,* is still the most popular tree for general planting and constitutes over 50 per cent of the total planted during the two years. The red gum, *Eucalyptus rostrata,* is said to withstand drought still better, however, and produces a more valuable wood, and is gaining in popularity with tree planters. Koa is also coming into greater prominence for planting on watersheds, the only difficulty being that good seed is hard to obtain on account of insect infestation.

During the previous two years, 44 per cent of the total number of trees planted were for the purpose of reestablishing a cover on watershed areas. That greater attention has lately been paid to reforestation for this purpose is evidenced by the fact that during the two years just ended the total number of trees planted on watershed areas constituted over 55 per cent of the total.


Hilo
FOREST RESERVES
ISLAND OF HAWAII

Names
No.
Hammond Hill
Ironstone
Kyle Hill
Spring Creek
Kyle Mountain
Cherry Valley
Mountain View
Old Forest Park
Old Quarry
Pine Ridge
Pleasant Valley
Rocky Point
Sand Hill
Sandy Beach
Sandy Point
Shady Grove
Shelter Rock
Silver Lake
Stony Point
Summit
Sunset Park
Swamp
Tall Pine
Tamarack
Tamarack Hill
Tamarack Swamp
Tamarack Valley
Tamarack Woods
Tamarack Woods Park
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Tamarack Woods Park Road Bridge
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MISCELLANEOUS.

The other activities of the Division of Forestry have been given secondary consideration in view of the importance of the two main subjects described above. There is much investigative work of an important nature which should be undertaken and a considerable amount of desirable record work in the office which must be deferred until technical assistance is available or until time presents the opportunity.

COOPERATION WITH THE LAND OFFICE.

As during previous years, the Division of Forestry has continued to cooperate with the Commissioner of Public Lands in giving advice on technical forestry questions which come up in that office in connection with general leases and other matters and in reporting on the fulfillment of clauses concerning forestry in such leases. When a new lease of government grazing lands is made, fencing and other clauses requiring forest protection have been drafted for inclusion in the lease. Technical field assistance has also been rendered in prescribing and directing the thinning of algaroba trees under licenses issued by the Land Office which will increase the yield of honey, beans and wood.

During the fall of 1918, the Superintendent of Forestry accompanied the new Governor and the Commissioner of Public Lands on an official inspection of government lands on Kahoolawe, Hawaii, and Maui.

KAHOOLAWE.

Assistance was also given the Land Office in the preparation of clauses for inclusion in the new lease of the island of Kahoolawe which runs for 21 years from January 1, 1919. These clauses provide for the management of the island in such a manner that the goats will be exterminated during the first year and every encouragement will be given to the revegetation of the island by natural and artificial methods. As will be recalled, on April 20, 1918, after a public hearing, Kahoolawe was withdrawn from the forest reserve and returned to the jurisdiction of the Commissioner of Public Lands because under the old arrangement the complete extermination of the goats could not be accomplished, and the Board was not able by law to make a lease whereby sufficient inducements could be offered anyone to bring this about. Over 5,000 goats have been eradicated from the island during the eight years that it has been under the control of this Board and the algaroba has spread to such an extent that there is now a large annual crop of beans which should be utilized along with several thousand

acres of good pili grass by restricted grazing. This the new lease allows, but only after the extermination of the goats, which must be accomplished during the first year. The whole purpose of the lease is to develop, conserve and improve the island rather than to exploit it.

KOKEE CAMPS.

A new departure for the Division was instituted during 1918, when at the expiration of a government lease, certain mountain meadow lands near the Kokee Stream and Halemanu on Kauai, within the Na Pali-Kona Forest Reserve, Kauai, at an elevation of 3,500 feet came under the jurisdiction of this Board. In response to requests from those who desired the privilege of camping out in this invigorating climate in the same manner that camping privileges are extended to many thousands on mainland National Forests, a total of 47 camping sites were surveyed out in the open areas along mountain streams and a form of permit which will safeguard the best interests of the forest and protect individual permittees was approved. These permits are for ten years and the annual charge for unimproved sites is based on the nominal rate of $10 per acre. The camp sites vary in size from .3 to 2.0 acres and are situated not far from the scenic beauties of Waimea Canyon, where the rainfall is not excessive and the nights are always cool. A good opportunity is presented here for those who desire a change from the lowlands in a cooler climate amidst pleasant surroundings. Kokee Camps are at present accessible over a passable automobile road which in all probability will be improved in the near future.

FIRST TERRITORIAL FAIR EXHIBIT.

Along with the other divisions of this Board, the Division of Forestry presented an exhibit at the First Territorial Fair, held at Kapiolani Park on June 10 to 15, 1918, which brought forth favorable comment from all who viewed it. In addition to the exhibits of young forest seedlings and transplants, native and introduced woods and bamboos, and maps showing forest reserves, a working erosion model was operated to show the beneficial effect of a forest cover on the runoff. By this model it was possible to bring home to the people in a very telling manner the lesson of the disastrous results of deforestation on watersheds and the valuable part which our native forest plays in the conservation of water and the importance of absolute forest protection in these islands.

PLANT PESTS.

Efforts have been made during the past two years to assist

Plate 5.

Durable Posts Cut from Eight Year Old Bloodwood Trees, *Eucalyptus corymbosa*, Grown in the Dry Land District, Waipio, Oahu

in the eradication of plant pests by destroying them on our own grounds and sending out warnings against their spread elsewhere. One of these, *Caesalpinia bonduc,* is a rambling climber with very sharp, hook-like spines, which upon invasion takes complete possession of everything within its reach. It has been in the islands for many years but fortunately is confined to a few localities. One of these was in Hering Valley in Makiki, but by persistent efforts in not only cutting and burning up all the plants and destroying the roots but also by destroying young seedlings which came up later, we have at last been able to eliminate it.

Another weed which spreads extensively and at an alarming rate is the Spiny Pig Weed, *Amaranthus spinosus.* As its name denotes, it bears a pair of very sharp thorns at the base of the leaves. Cattle will not eat the plant and shun the localities where it occurs. Upon detecting its unusually rapid spread in Manoa Valley attention to it was called in the May, 1917, "Hawaiian Forester and Agriculturist," with the advice that wherever found it be rooted out and burned before the seeds are ripe.

A new introduction, which it is hoped will not become established here, by the persistent efforts which have already been made to eradicate it, is the Morning Glory, or Bindweed, *Convolvulus arvensis,* which was discovered last fall on Maui. A warning against it was published in the November, 1918, "Hawaiian Planters' Record," and upon investigation by Ranger Lindsay it was found to be confined to two small patches along the Kahului Railway in Paia. This leads one to believe that it came in with hay or some other feed stuff. It is a troublesome weed on cultivated fields in the Atlantic States and California, and it would be very unfortunate if it became established here.

Chance introductions such as this are apt to occur in spite of all precautions but by exerting our best efforts in their eradication upon discovery and by apprising the people of the necessity of doing likewise it is believed that a great deal can be accomplished to prevent their establishment in these islands where we already have our share of plant pests.

PUBLICATIONS.

The following have been published by the Division of Forestry during the past two years in addition to the monthly and annual reports and special articles which have appeared in "The Hawaiian Forester and Agriculturist," the official monthly magazine of the Board:

April 6, 1917. "Report of the Division of Forestry for the Biennial Period Ending December 31, 1916."
July 28, 1917. Rule IV, Division of Forestry.
August, 1917. Botanical Bulletin No. 4, "The Ohia Lehua Trees of Hawaii," by Joseph F. Rock, Consulting Botanist.
May, 1918. "Forestry as Applied in Hawaii," by C. S. Judd, Superintendent of Forestry. Reprint from "The Hawaiian Forester and Agriculturist," Vol. XV, No. 5.

SUMMARY.

In conclusion, it is a pleasure to report that progress has been made in the two main activities of the Division, forest protection and forest extension. The work of examining, surveying, and setting aside the main forest reserve system has been concluded and the reserves which are shown on the maps printed with this report, now include 814,926 acres, 68 per cent. of which is government land. On the four main islands seven forest rangers are on duty protecting and administering government forest reserve lands and they have had a hand in the construction and repairing of 18.63 miles of reserve boundary fences and the elimination of much wild stock during the biennial period. Tree planters are gradually reforesting open areas in the reserves mainly in regions where water for city and domestic use is required. For the continuation of these lines of work an adequate appropriation for the coming biennial period will be greatly appreciated and more particularly for a few additional forest rangers, for more extensive fencing, and for the establishment of new forest nurseries accompanied by tree planting.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry and Chief Fire Warden.

LIST OF DISTRICT FIRE WARDENS

CHIEF FIRE WARDEN.

C. S. JUDD, Superintendent of Forestry, ex-officio.

DEPUTY FIRE WARDEN AT LARGE.

DAVID HAUGHS, in and for the Territory of Hawaii.

DISTRICT FIRE WARDENS.

KAUAI.

A. MENEFOGLIO, in and for Wainiha Valley, District of Halelea.

W. F. SANBORN, in and for the District of Halelea, excepting Wainiha Valley.

L. D. LARSEN.

GEORGE HUDDY, Assistant District Fire Warden. In and for the District of Koolau, excepting the land of Anahola.

E. M. CHEATHAM, In and for the portion of the Districts of Koolau and Puna, extending from the land of Anahola to the land of Olohena, inclusive.

C. H. WILCOX, In and for that portion of the District of Puna, south of and including the land of Wailua.

FRANK A. ALEXANDER, In and for that portion of the District of Kona, extending from the Hanapepe Valley to the Puna District line.

B. D. BALDWIN, In and for that portion of the District of Kona lying between and including the Waimea, Poomau, and Kauaikinana Valleys on the west and the Hanapepe Valley on the east.

ERIC A. KNUDSEN, In and for the District of Na Pali and that portion of the District of Kona, lying to the west of Waimea, Poomau, and Kauaikinana Valleys.

OAHU.

F. S. LYMAN, JR., In and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.

ANDREW ADAMS, In and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.

W. H. CLEGHORN, In and for that portion of the District of Koolaupoko, extending from the Koolauloa District line to the land of Heeia.

WM. HENRY, In and for that portion of the District of Koolaupoko, extending from and including the land of Heeia to the land of Kailua.

JOHN HERD, In and for that portion of the District of Koolaupoko, extending from and including the land of Kailua to Makapuu Point.

CHARLES H. BAILEY, In and for that portion of the District of Kona, extending from Makapuu Point to Palolo Valley.

JOSEPH K. KAPONO, In and for Palolo Valley, District of Kona.

C. MONTAGUE COOKE, In and for Manoa Valley, District of Kona.

W. M. GIFFARD, In and for that portion of the District of Kona lying between Pauoa and Manoa Valleys.
L. A. MOORE, In and for Nuuanu Valley, District of Honolulu.
WM. WEINRICH, In and for that portion of the District of Ewa lying to the West of the main government road.
JAMES GIBB, In and for that portion of the District of Ewa lying between the lands of Moanalua and Waiawa.
H. BLOOMFIELD BROWN, In and for that portion of the District of Ewa lying to the east of the main government road between the land of Waipio and the Kaukonahua Gulch.
A. A. WILSON, In and for that portion of the District of Waialua, lying between the Kaukonahua and Helemano Gulches.
GEORGE M. ROBERTSON, In and for that portion of the District of Waialua lying between the Helemano and Opaeula Gulches.
GEORGE WILSON, In and for that portion of the District of Waialua lying between the Opaeula Gulch and the Koolauloa District line.
F. MEYER, In and for that portion of the District of Waianae lying to the west of the Waianae Mountains.

MOLOKAI.

JAMES MUNRO, In and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.
C. C. CONRADT, In and for that portion of the Island of Molokai including and lying to the east of Wailau Valley and the land of Mapulehu.

LANAI.

GEORGE C. MUNRO, In and for the Island of Lanai.

MAUI.

A. W. COLLINS, In and for the District of Lahaina.
DAVID T. FLEMING, In and for the District of Kaanapali.
C. E. S. BURNS, In and for the District of Wailuku.
F. F. BALDWIN, In and for the District of Hamakuapoko and the west half of the District of Hamakualoa.
W. F. POGUE, In and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi Gulch.
MARION CABRAL, In and for that portion of the District of Koolau lying to the east of Makapipi Gulch.
JOHN CHALMERS, In and for the District of Hana.
JOHN FASSOTH, In and for the District of Kipahulu.
L. VON TEMPSKY, In and for the Districts of Kula and Kaupo.

HAWAII.

G. C. WATT, In and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.
SAM P. WOODS, In and for that portion of North Kohala extending from the northern boundary of the land of Kawaihae I. to and including the land of Kaauhuhu.

A. W. CARTER, In and for the District of South Kohala.
W. P. NAQUIN, In and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.
DONALD S. MACALISTER, In and for that portion of the District of Hamakua extending from and including the land of Kukaiau to the Hilo District line.
JOHN M. ROSS.
H. S. RICKARD, Assistant District Fire Warden, In and for that portion of the District of Hilo extending from the Hamakua District to the land of Makahanaloa.
JOHN T. MOIR, In and for that portion of the District of Hilo extending from and including the land of Makahanaloa to the land of Kikala.
JOHN A. SCOTT, In and for that portion of the District of Hilo extending from the Puna District line to and including the land of Kikala.
C. F. ECKART, In and for the District of Puna.
JAMES CAMPSIE, In and for that portion of the District of Kau extending from the Puna District line to and including the land of Punaluu.
GEORGE GIBB, In and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.
R. A. McWAYNE, In and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.
T. C. WHITE, In and for that portion of the District of Kona extending from the land of Kaapuna to and including the land of Hookena.
L. P. LINCOLN, In and for that portion of the District of Kona extending from the land of Hookena to and including the land of Kaawaloa.
T. C. WHITE, In and for that portion of the District of Kona extending from the land of Kaawaloa to and including the land of Kahaluu.
JOHN A. MAGUIRE, In and for that portion of the District of Kona extending from the land of Kahaluu to the Kohala District line.

FOREST RANGERS.

Kauai.

W. V. HARDY.
HOSEA K. LOVELL, For the Island of Kauai.

Oahu.

DAVID KAPIHE, In and for Tantalus and Makiki and Pauoa Valleys.
C. H. HIPPLE, In and for Palolo, Manoa, and Nuuanu Valleys.
JOHN PILILAAU, In and for the Waianae District.

Maui.

JAMES LINDSAY, For the Island of Maui.

Hawaii.

A. J. W. MACKENZIE, For the Island of Hawaii.

HONORARY FOREST RANGERS.

W. H. SHIPMAN, In and for the District of Puna and Hilo, Hawaii.
BRUCE CARTWRIGHT, JR., For the enforcement of Rule IV, Division of Forestry, on Oahu.

DISTRICT FORESTERS.

Kauai.

Albert S. Wilcox, L. D. Larsen, C. H. Wilcox, Edward Broadbent, Rev. J. M. Lydgate, Walter D. McBryde, Eric A. Knudsen, B. D. Baldwin.

Oahu.

Andrew Adams, L. L. McCandless, John Herd, Paul R. Isenberg, W. W. Goodale.

Molokai.

James Munro, C. C. Conradt.

Lanai.

George C. Munro.

Maui.

A. W. Collins, F. F. Baldwin, W. F. Pogue, L. von Tempsky, Dr. J. H. Raymond, D. T. Fleming, John Fassoth.

Hawaii.

G. C. Watt, A. W. Carter, W. P. Naquin, John M. Ross, John A. Scott, George Gibb, W. R. Castle, James Campsie, John A. Maguire.

REPORT OF THE FOREST NURSERYMAN

Honolulu, Hawaii, December 31, 1918.

Superintendent of Forestry,
Honolulu, Hawaii.

Dear Sir: I respectfully submit the following report for the years 1917 and 1918:

COLLECTION AND EXCHANGE OF SEED.

We have had many applications from abroad during the past two years for seed of our exotic and indigenous plants. From Australia we received a large number of orders for algaroba seed, *Prosopis juliflora*. From other countries the demand was principally for flowering trees and shrubs. We have received in exchange seed such as different kinds of ficus, junipers, cypress, and a number of species of the pine family, etc.

TREES DISTRIBUTED FROM GOVERNMENT NURSERIES DURING 1917 AND 1918.

Oahu: 1917 Honolulu:	Seedlings	Transplants	Pot Grown	Total
Sold	.....	1,377	1,366	2,743
Gratis				
Arbor Day	.....	.....	10,490	10,490
Forest Reserves	6,000	5,000	1,495	12,495
Homesteaders	7,100	2,350	640	10,090
Military Posts	.....	2,500	3,000	5,500
Parks	.....	.....	300	300
Schools	.....	.....	850	850
Street Planting	.....	.....	432	432
Miscellaneous	9,000	1,034	1,370	11,404
	22,100	12,261	19,943	54,304
Hawaii sub-nursery, including Arbor Day				7,568
Kauai sub-nursery, including Arbor Day				8,087
Plantation companies, etc.				283,550
				353,509

Oahu: 1918. Honolulu:				
Sold	.....	830	1,795	2,625
Gratis				
Arbor Day	.....	.....	10,500	10,500
Homesteaders	3,000	2,803	712	6,515
Forest Reserves	7,700	2,050	286	10,036
Military Posts	.....	5,390	1,604	6,994
Parks	.....	.....	55	55
Schools	.....	250	1,266	1,516
Street and Road Planting	2,400	.....	724	3,124
Miscellaneous	1,000	1,890	3,927	6,817
	14,100	13,213	20,869	48,182

Hawaii sub-nursery, including Arbor Day	6,188
Kauai sub-nursery, including Arbor Day	6,010
Plantation companies, etc.	237,522
	297,902

Total Tree Distribution, 1917 and 1918, 651,411.

Government Realizations.

1917.

Sale of Plants	$ 41.85
Rent of Office, Nursery Grounds	420.00
	$461.85

1918.

Sale of Plants	$ 45.55
Rent of Office, Nursery Grounds	420.00
Sale of aged horse	50.00
	$515.55

Preservation and Extension of Forestry and Forest Reserves.

1917.

Rent and Fees	$212.50
Sale of black sand	52.25
Sale of posts from Tantalus	2.25
Total	$267.00

1918.

Rent and Fees	$210.25
Sale of black sand	181.00
Total	$391.25

Government realizations are deposited with the Treasurer at the end of each month. Collections on account of Preservation and Extension of Forestry and Forest Reserves are deposited with the Treasurer at the end of each quarter, and go into the special fund.

PLANTATION COMPANIES AND OTHER CORPORATIONS.

The number of trees ordered by plantation companies and other corporations during 1918 was not so large as in some of the past years. The falling off, no doubt, was due to the scarcity of labor on most of the plantations.

The following is a list of trees distributed during the past two years:

	1917	1918	Total
Eucalyptus robusta	127,300	95,200	222,500
" citriodora	20,100	25,500	45,600
" globulus	1,550	42,700	44,250
" rostrata	15,000	34,000	49,000
" resinifera	3,000	10,000	13,000
" crebra	38,000	.....	38,000
" rudis	.....	10,000	10,000
" pilularis	5,050	.....	5,050
Casuarina equisetifolia	51,000	18,200	69,200
" quadrivalvis	3,250	1,000	4,250
Grevillea robusta	10,000	.....	10,000
Swietenia mahogani	1,000	.....	1,000
Cryptomeria Japonica	5,000	.....	5,000
Miscellaneous	3,300	922	4,222
Total	283,550	237,522	521,072

MAKIKI STATION.

The work at this station consisted principally of transplanting trees into boxes, pots and tin cans, mixing and sterilizing soil to be used for seed raising and transplanting at this station and at the Nursery on King Street.

A great deal of saw mill work is done at this station which consists of cutting up wood for seed and transplant boxes, laths for making crates for shipping plants, fence posts, etc.

HONOLULU WATERSHED.

During the year 1917, 6,054 koa, 300 kukui, and 1,484 mahogany trees were planted, and during 1918, 2,742 koa, and 686 yellow poinciana trees were planted in the Makiki Valleys on the Honolulu Watershed. Other work consisted in rooting out pests. The *Caesalpinia bonduc* is almost exterminated both in Hering and Opu Valleys.

For about three months during the summer of 1918 the men employed on the watershed were transferred to the Tantalus forest for the purpose of cutting away and pruning the trees along the road. This was done at the request of people who had occasion to use the road who complained about the very bad condition of the road through the forest. They complained that owing to the dense shade caused by the trees, the road never had a chance to dry up, consequently the soil got churned into mortar by the wagons and became so deep in parts that it was next to impossible to get over it with any kind of a vehicle. The work was certainly appreciated by the people using the road, and the good effect was plainly observed a few weeks after the work was done. Considerable work has been done on the trails running through the watershed. There are long stretches of trails that require to be kept

open, not only for the convenience of those who may want to use them but as a protection during the summer months against fires.

NURSERY AND GROUNDS.

The propagation and distribution of plants has been carried on with the aid of one man with occasional help from two seed boys and the yard man during the busy season. On the grounds up to about eighteen months ago High Sheriff Jarrett provided us with two trusties to help in keeping the grounds in good condition. Owing to not having men whom he could trust to send us we have been deprived during the past eighteen months of that much needed help. After the prison help was withdrawn it became necessary to employ two extra men. The regular yardman being often required to do rough carpentry work, pipe fixing and assisting at the saw mill in Makiki, etc., left the ground during the great part of the time to be kept in order by two men.

The wooden curbing laid about twelve years ago along the walks is fast decaying, and has disappeared entirely from a number of places. New curbing ought to be laid so that the parking around the buildings and the part used by the public could be kept in a more presentable condition.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

REPORT OF THE CONSULTING BOTANIST

Honolulu, Hawaii, December 31, 1918.

The Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I beg to submit my report as Consulting Botanist for the biennial period ended December 31, 1918.

During the summer of 1917 the writer visited Southern California for the purpose of acquainting himself with the large nurseries existing in Santa Barbara. He collected seeds in the various gardens in Southern California, and purchased numerous plants from the nurseries in Santa Barbara. The plants purchased were nearly all ornamental not as yet cultivated in the Territory. Among them were quite a number of palms, and also vines of which the most noteworthy were *Bignonia Kerere,* one of the handsomest and largest flowering bignonia known to the writer, and *Vitis capensis,* a South African ornamental grape with very handsome foliage. They have been planted out on the College of Hawaii campus where they are thriving well. At about the same time quite a number of valuable plants were presented to the writer for the Territory by the Conservatories of the Golden Gate Park, San Francisco, California. Among them were several species of palms, Aroids, Pandanaceae, etc.

After his return to the islands he visited Hawaii with Commissioner Giffard and the Superintendent of the Golden Gate Park Conservatories for the purpose of collecting seeds of native plants intended for exchange purposes.

In August, 1917, the Board published Botanical Bulletin No. 4, "The Ohia Lehua Trees of Hawaii," being a revision of the Hawaiian species of the genus *Metrosideros,* with especial reference to the Hawaiian species and varieties. It is a 76 page bulletin with 31 plates, and is based on the researches by the writer on material in the Board's herbarium now in the safe keeping of the College of Hawaii. In 1917 he also published a book on "The Ornamental Trees of Hawaii." While not an official publication, it is intimately connected with the work done by the writer as Consulting Botanist.

Seeds of numerous species of plants were imported by the writer and turned over to the Board. He personally collected quantities of seed of *Acacia arabica,* a very valuable dry district

tree, from a tree growing in Mrs. Mary E. Foster's garden on Nuuanu Avenue. These seeds were distributed to numerous individuals throughout the Territory. He also imported seeds of various species of *Atriplex,* (Salt bushes) from the Agricultural Station at Giza, Egypt. These were distributed to various ranches in the islands, especially to the dry district (sheep) ranches, as on Molokai.

He also rendered services in determining plants for the Board and other parties in the Territory. It may be remarked that he completed his monograph on the Hawaiian lobelias, based partly on material in the Board of Agriculture herbarium. A duplicate set of the plants properly identified and labeled has been turned over to the Board. The monograph is being published by the Bernice P. Bishop Museum and comprises over 400 pages and 218 plates.

He also prepared a bulletin on "The Arborescent Indigenous Legumes of Hawaii," which is ready to go to press as Botanical Bulletin No. 5 of the Board of Agriculture and Forestry. It may also be of interest to note that the writer has prepared a paper treating all the leguminous plants found in the Territory, both cultivated and wild. The paper will be published with illustrations by the Hawaiian Sugar Planters' Experiment Station.

In cooperation with the Board of Health, at the request of the Executive Officer of the Board of Agriculture and Forestry, the writer has determined medicinal plants collected by a kahuna and has cooperated with the Board of Health in making a list of Hawaiian plants known to be of medicinal value.

During the summer of 1918, the writer visited the islands of Hawaii and Maui for the purpose of collecting and making notes on Hawaiian forest conditions. In conjunction with Mr. A. J. W. Mackenzie, the Forest Ranger at 29 Miles, Hawaii, he spent two days traversing and exploring the forest reserve lands near Kulani, entering the forest below 29 Miles, and ascending to the top of Kulani on the slopes of Mauna Loa.

While on Maui he ascended Haleakala and entered the forest reserve back of Puunianiau as well as the forest reserves northeast of Olinda to Waikamoi and Puohaokamoa. The condition of the forest near Waikamoi is not so good as that of Puohaokamoa. Numerous weeds have made their appearance which are penetrating into the forest, notably Hilo grass. As it was a very clear day the writer could overlook the whole forested area on that side of Haleakala into Keanae and the numerous dead ohia trees at an elevation of 3,500 feet to 4,000 feet gave the landscape a sad appearance. At Puohaokamoa the forest is in splendid condition, sphagnum moss covers the ground and the trunks of trees, the whole making a very formidable and impenetrable jungle.

On west Maui the writer ascended the summit of Mauna Eeke in company with Mr. H. B. Penhallow of Wailukn. The day was perfect and the writer took many photos and notes, and collected many plants. Mauna Eeke is a great flat depression with much standing water—large pools with islands. The whole vegetation is very stunted and only a few inches high, with the exception of the true lobelias which measure several feet in height. The vegetation is mainly composed of a species of silversword which abounds by the thousands, lobelias, geraniums, violets, scaevola, rushes and grasses, all peculiar to that mountain summit. The vegetation is somewhat different from that of Puukukui, 1000 feet higher than Eeke, silversword are very sparingly represented on the former mountain, while thousands of individuals inhabit the latter. Eeke is furrowed by many volcanic fissures of enormous depth as well as many huge volcanic circular blow holes on the margins of which we find the true lobelias very numerous.

He also visited Waihee Valley. The trail was entirely overgrown so that it was necessary to walk in the stream bed. The vegetation is very dense and there is no danger of forest extermination, so long as the summit swamps back of the valleys are not tampered with.

Respectfully submitted,

JOSEPH F. ROCK,
Consulting Botanist.

DIVISION OF ENTOMOLOGY

Report of the Entomologist

Honolulu, Hawaii, December 31, 1918.

To the Commissioners of Agriculture and
Forestry for the Territory of Hawaii.

Gentlemen: I submit herewith my report for the biennial period January 1st, 1917, to December 31st, 1918.

PROPAGATION AND DISTRIBUTION OF BENEFICIAL INSECTS.

Unsettled conditions abroad have made it inadvisable to undertake any new field work during the biennial period and on this account the work of the division has been very much restricted, being confined principally to the propagation and distribution of beneficial insects. The insects handled have been the corn leaf hopper egg parasite, the fruit fly and melon fly parasites, dung fly parasites, etc., and a tabulation of the species, the numbers propagated, and the localities to which distributed follows (see Table I). This work, which was undertaken in the beginning to facilitate and safeguard introductions, is now being applied directly to the control of the pests concerned with much practical benefit, and might be very profitably extended. The control of the corn leaf hopper on the lowlands where corn cultivation is confined to the winter months particularly demands artificial multiplication and distribution of the parasite, for there is obviously a great decimation of the parasite during the off-season, and the advantage which the hopper enjoys with respect to length of life, powers of flight and prolificness gives it a decided handicap in new plantings. The rapid increase of the hopper at this time, if allowed to go unchecked, is certain to prove disastrous to the crop, but by bringing in parasites in numbers a check is secured at once, which remains to the completion of the harvest. The same principle applies, although the conditions are not the same nor the case so obvious, with respect to the other parasites, and there is no doubt that a great deal of benefit is derived from "assisting nature" even in this small way.

INVESTIGATION PRELIMINARY TO FIELD WORK.

While enterprise has languished, the main field of work has not been entirely forgotten. New projects are being investigated, so that if it is desired to resume field operations when the time is ripe, it may be done on a firmer basis and with less delay than would be the case had the problems not been gone over in anticipation. With due regard to the full scope of the work that has already been done, it is still believed that the field has not been exhausted, and that the occasion for renewed efforts holds promise of results that will bring about an improvement in the conditions surrounding agriculture and stock-raising.

CORN LEAF HOPPER AND ITS CONTROL.

In connection with the propagation of the corn leaf hopper parasites, a study has been made of the hopper itself and statistical data collected on all the important points in its life history. The effectiveness of the parasites is proved by the high average of parasitism disclosed (close to fifty per cent).

CONTROL OF MEDITERRANEAN FRUIT FLY BY INTRODUCED PARASITES.

The collection of statistics on the parasitism of the fruit flies is being continued by the U. S. Bur. Ent. office, and the following remarks in regard to the parasitism of the Mediterranean fruit fly are quoted from their latest publication. The statistics appear in Table II:

"Thus, as seen in the table, nearly one-half of all the Mediterranean fruit-fly developing during the year were destroyed and this is entirely the result of parasitic importations. This achievement, solely due to the efforts of the Territorial Board of Agriculture and Forestry, is worthy of unusual commendation. Insufficient emphasis perhaps has been placed during recent years upon the utility of these parasites. The constant extinction of at least 45 per cent of all worms developing in fruit, apart from the destruction of this pest through other agencies already present in the islands, notable among them being the ant *Pheidole megacephala* Fabricius, without question greatly decreases the infestation of such fruits as the orange (*Citrus sinensis*) and certain varieties of mango and avocado not ordinarily susceptible to prohibitive infestation except under conditions permitting an unchecked multiplication of the fly. This point has come to light during 1917, and the statement seems justified that a 50 per cent reduction in the numbers of the fly brings little relief to its favored host fruits, but that those fruits classed as unfavored hosts show a market improvement in the degree of infestation, and some may become almost wholly free from larvae. The propagation of such fruits and the encouragement of the parasitic method of control would seem to be the most favorable method of contending with this pest in Hawaii.

"This 47 per cent reduction in the abundance of the fruit fly in Hawaii serves another purpose well worthy of mention. It is an important help contributing toward reducing the chances of its introduction to the mainland.

"The parasite *Tetrastichus giffardianus* Silvestri was more abundantly recovered from fruit collections in 1917 than in any preceding year since its liberation in the islands in 1914. It was recovered, however, only in material collected about Honolulu. Its ability to penetrate to the interior of soft fruits broken or containing holes enables it when numerous to parasitize large numbers of larvae in such fruits as the mango, the orange or common guava. The total average parasitism in larvae from all fruits during the year was materially increased through the work of *T. giffardianus* in such fruits.

"The total parasitism by all species during 1917 was 14.3 per cent. higher than in 1916. The average infestation of all fruits combined was, however, not strikingly different from that of 1916.

"As shown in the table, the parasitism by *Opius humilis* is 4.5 per cent less than in 1916, while that of *Diachasma tryoni*, *D. fullawayi* Silvestri and *Tetrastichus giffardianus* was 7.0 per cent, 5.2 per cent, and 6.6 per cent greater, respectively.'

**

CONTROL OF THE MELON FLY BY PARASITE FROM INDIA.

While data has not yet been published on the parasitism of the melon fly it is known to range from twenty to forty-five per cent on the island of Oahu, and in the Kona district of Hawaii, where circumstances are peculiarly favorable, the parasitism has proved an effective check, as shown in the following quotation from a report by the U. S. Bur. Ent. representative in Hawaii:

"A field trip to the Kona coffee district extended from April 19th to May 17th. I found conditions so interesting that the trip was extended longer than originally intended. Perhaps the most interesting situation now in evidence in the district is the control exerted over the melon fly by the newly introduced parasite *Opius fletcheri*. This parasite was liberated in the district in June, 1916. At the present time the fly is so reduced there that it is in no sense destructive. I examined carefully 400 cucumbers of various sizes, 28 young watermelons, 20 young muskmelons, 21 young pumpkins, and 2,456 ripe wild cucumbers, *Momordica sp.* I found only one egg puncture in one of the cultivated cucumbers, which was a surprising and wholly unexpected condition. None of the cucumbers had scars or deformities that are so characteristically seen in all gardens where the melon fly is present. None of the melons or the pumpkins were touched by the melon fly, nor could any injured or stung blossoms be found. The wild Momordica grows luxuriantly over large areas in Kona. Of the 2,456 fruits examined, 266 contained eggs or larvae of the melon fly. Most of these infested ones were found in an isolated spot in the center of an overgrown, abandoned cotton field. From the infested Momordicas a total of 676 melon fly larvae were secured. These were heavily parasitized by *O. fletcheri* the parasitism amounting to 96.9%. Those engaged in gardening the district are very much pleased with the new condition and report all along the line very favorably. I consider this control to be the result of two factors. One is the work of the parasite and the other is the presence of the great quantities of wild Momordicas everywhere. The Momordica fruits heavily throughout the year and is certainly a very favored host of the melon fly. The fruits are universally small, seldom being more than an inch in diameter. This permits the fly to be present constantly and in

fruits small enough to allow the parasite to reach most of the larvae. The parasitism is thus high and the flies that do reach maturity have a great abundance of a natural host constantly at hand to absorb their eggs. The cultivated gardens scattered through the district are thus attacked by a greatly reduced number of flies and these are not necessarily in a condition to deposit an excessive number of eggs for they must be continually ovipositing in the wild cucumbers in all directions, both in and about the gardens. In May, 1916, I examined 442 wild cucumbers at the same locality where the above were examined and just a few weeks prior to the liberation of the parasite. Of these, 248 were well invested. The comparison with the present condition is very interesting."

IMMIGRANT SPECIES AND THEIR MENACE.

Fortunately, no new menace to our industries has appeared during the biennial period, and with the exception of an unusually heavy infestation of bananas by mealy bugs in the summer of 1917, nothing has occurred of a nature to require more than ordinary measures of protection or control. Yet immigrant species are constantly finding their way to the islands; it is an inevitable circumstance, and we should be prepared for emergencies, such as the appearance of a really dangerous insect.

WHITE ANTS.

It is desired at this juncture to call attention to the alarming and increasing ravages of white ants. One species in particular, which has only recently gained a foothold here, is certain to become a most destructive agent to all kinds of wood and wood products as time goes on and its range becomes more extensive. They are being studied, and more detailed information concerning them will be given later.

ROUTINE WORK AND PUBLICATIONS.

A great deal of the time of the entomologist has been taken up by routine work, investigating reported cases of insect depredations, giving advice or assistance, etc. The insect collections have been maintained and added to. Some groups of insects have been studied closely, where an intimate knowledge of the insects bore on economic work in hand.

A list of the publications of the entomologist during the biennial period follows:

1. Description of a New Species of Spalangia. Proc. Haw. Ent. Soc., v. 3, No. 4, pp. 292-294. Dung fly parasite.
2. Notes on Hawaiian Prosopidae. Proc. Haw. Ent. Soc., v. 3, No 5, pp. 393-399.

3. A New Genus of Pteroptricine Aphelininae (Hymenoptera). Proc. Haw. Ent. Soc., v. 3, No. 5, pp. 463-464. Mealy bug parasite.
4. The Corn Leaf Hopper. Bul. 4, Div. Ent. Haw. Bd. Agr. and For.
5. Natural Control of Scale Insects in Hawaii (in course of publication).
6. New Genera and Species of Braconidae, Mostly Malayan (in course of publication).
7. Control of the Melon Fly in Hawaii by a Parasite introduced from India (in course of publication).
8. Review of the Genus Sierola, with Description of New Species (in preparation).
9. Notes on White Ants in Hawaii (in preparation).

Respectfully submitted,

DAVID T. FULLAWAY,
Entomologist.

TABLE I.

TABULATION SHOWING THE LIBERATION OF BENEFICIAL INSECTS, 1917-1918.

	Oahu	Kauai	Molokai	Maui	Hawaii	Lanai	Tot.
FRUIT FLY PARASITES.*							
Tetrastichus giffardianus	13,413	200	.....	280	1,500	....	15,393
Diachasma fullawayi	1,992	.....	.....	228	136	....	2,356
Diachasma tryoni	8,279	3,020	.....	575	1,605	62	13,541
Dirhinus giffardi	2,200	.....	.....	.....	200	....	2,400
Opius humilis	2,242	.....	.....	310	110	35	2,777
Galesus silvestri	755	.....	.....	.....	2,570	....	3,325
Total	28,881	3,020	.....	1,393	6,201	97	39,792
MELON FLY PARASITE†							
Opius fletcheri	38,165	1,553	260	1,324	11,890	....	55,192
DUNG FLY PARASITES‡							
Spalangia cameroni	660	.....	.....	16,270	700	....	17,630
Pachycrepoideus dubius	.....	.....	.....	2,100	.....	....	2,100
Total	660	.....	.....	18,370	700	....	19,730
CORN LEAF HOPPER PARASITE.§							
Paranagrus osborni	234,976	28,750	15,450	145,950	35,100		460,226

*Liberated at:
Oahu: Honolulu, Mokuleia, Waianae, Pauoa, Wahiawa, Robinson, Ewa.
Hawaii: Kohala, Kamuela, Hilo, Kapoho, Waimea, Glenwood, Mt. View.
Maui: Hana, Paia, Wailuku, Haiku.
Kauai: Lihue, Homestead.
Lanai: Keomuku.

§Liberated at:
Oahu: Honolulu, Kailua, Moililli, Waipio, Pearl City, Kaneohe, Heeia, Aiea.
Maui: Kula, Haiku, Makawao, Paia, Wailuku.
Kauai: Lihue, Kilauea, Kapaa, Kahaheo, Kealia, Waimea.
Hawaii: Kohala, Hilo, Kapoho, Waimea, Kau, Kamuela.
Molokai: Kamelo, Pukoo.
Lanai: Keomuku.

† Liberated at:
Oahu: Honolulu, Moililli, Niu, Mokuleia, Waianae, Pearl City, Paumalu, Aiea, Heeia, Moanalua, Robinson, Ewa, Kailua.
Hawaii: Paauhau, Hilo, Glenwood, Waimea, Kapoho, Honokaa, Kamuela.
Kauai: Hanalei, Lihue, Kealia.
Maui: Hana, Haiku.
Molokai: Kamalo.

‡Liberated at:
Oahu: Honolulu.
Maui: Paia, Haiku.
Hawaii: Kohala.

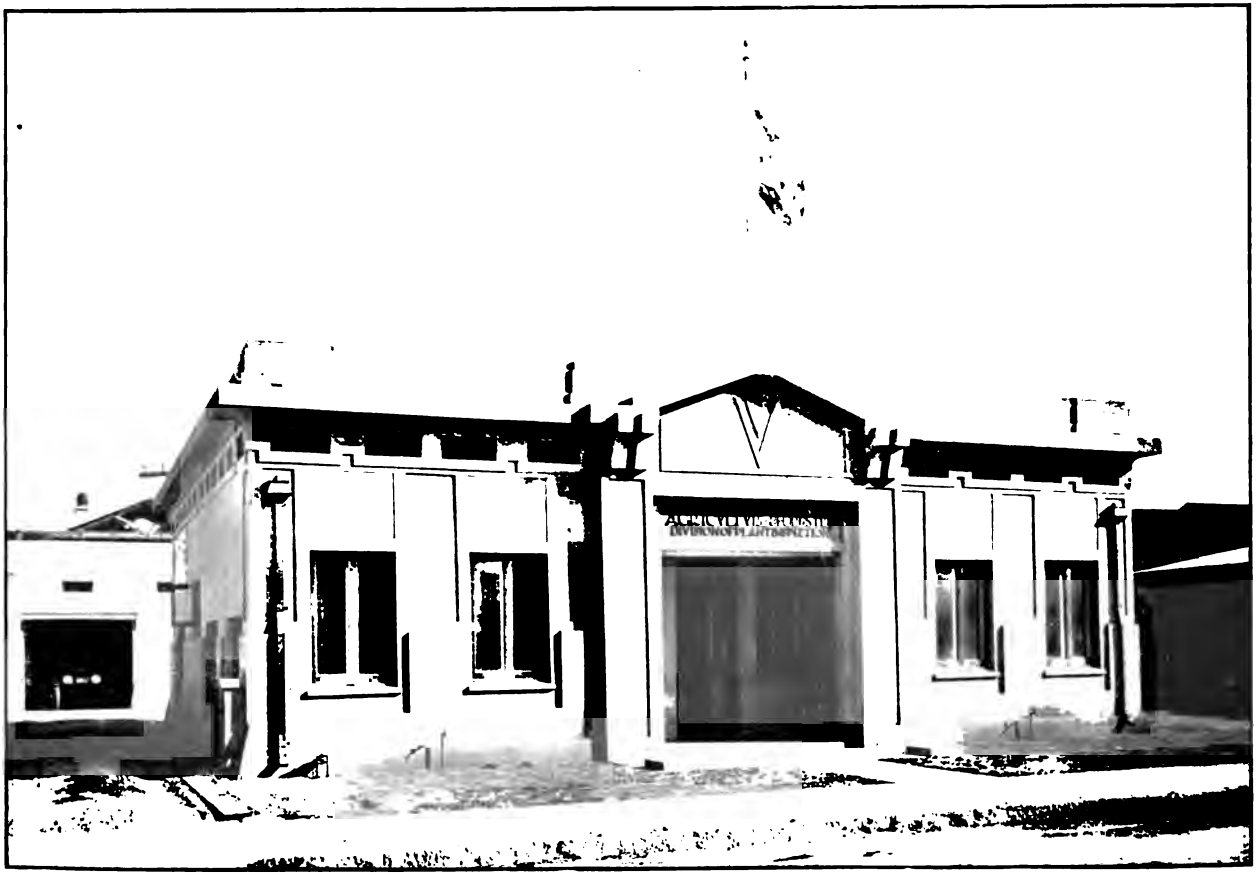
TABLE II.

TOTAL PARASITISM, BY MONTH, OF ALL LARVAE OF MEDITERRANEAN FRUIT FLY (CERATITIS CAPITATA) COLLECTED IN HAWAII DURING 1917.

PERCENTAGE OF PARASITISM.

Month	Number of Larvae	Opius humilis	Diachasma tryoni	Diachasma fullawayi	Tetrastichus giffardianus	Total in 1917	Total in 1916
January	6,183	39.0	15.6	2.0	2.4	59.0	6.98
February	4,568	20.0	8.6	3.0	1.3	32.9	19.5
March	5,901	27.1	22.5	12.6	1.3	63.5	14.7
April	2,861	9.0	27.6	5.5	1.2	43.3	37.64
May	4,439	8.8	26.4	3.4	2.3	40.9	26.69
June	5,919	11.7	16.3	.3	7.8	36.1	27.81
July	4,125	3.9	26.6	.9	19.6	51.0	18.52
August	8,726	2.8	16.4	4.7	9.2	33.1	37.5
September	9,047	5.2	31.8	31.2	2.7	52.4	45.2
October	11,309	7.2	16.4	13.2	8.4	45.2	44.3
November	5,919	17.2	22.6	11.6	20.9	72.3	44.3
December	3,142	5.3	16.7	5.2	7.0	34.2	44.1
Average, 1917	72,139	12.7	20.3	7.3	7.2	47.5	
Average, 1916	83,304	17.2	13.3	2.1	.6		

Plate 6.



New Building of the Division of Plant Inspection, Kekuanaoa Street, Honolulu.

Division of Plant Inspection

Report of the Chief Plant Inspector

Honolulu, Hawaii, December 31, 1918.

Board of Commissioners of Agriculture and
Forestry, Honolulu, Hawaii.

Gentlemen: I have the honor to submit herewith the biennial report of the Division of Plant Inspection for the period from January 1, 1917, to December 31, 1918.

The work performed by the Chief Plant Inspector and his assistants during this biennial period consisted of the following:

1. The inspection of all fruits, vegetables, plants and seeds arriving in this Territory from foreign countries and the mainland in order to prevent the introduction of pests and plant diseases which do not at present exist in Hawaii and which have proven a menace to the agricultural industries of other countries.

2. The inspection of all fruit, vegetables, plants and seeds that are shipped from the port of Honolulu to ports of the other islands, the purpose of which is to prevent the spread to adjacent islands of any pest which might accidentally be introduced on Oahu through the port of Honolulu, this being the only port of entry for horticultural articles from foreign countries and consequently the most likely place where an accidental introduction of pests would make its first appearance.

3. The identification, preserving and mounting of insects taken in inspection, the acquisition of specimens of the most important economic insects occurring in foreign countries and the United States together with examples showing their life history and the nature of the damage done by them, and the building up of a reference library of economic insects and plant diseases.

In addition to the various duties pertaining to the work of inspection it has been necessary to devote much time to supervising the labor incidental to reorganizing and establishing the new Division and to moving the scattered equipment to permanent quarters.

In order to efficiently handle the constantly increasing volume of inspection work it became expedient to reorganize the Division of Entomology by making two separate divisions: the Division of Entomology and the Division of Plant Inspection, which the Legis-

lature sanctioned at its last session, and which went into effect on July 1, 1917.

Since the activities of the Division of Plant Inspection are confined to the waterfront and immediate vicinity, upon the recommendation of the Chief Plant Inspector, the Board of Commissioners of Agriculture and Forestry agreed to move this Division to a more convenient locality. The old equipment of the Division was distributed in out of the way places on the various wharves. Examination of plants on open docks with cracks and crevices and cases of merchandise and other convenient hiding places at hand for insects that are likely to escape from such plants notwithstanding the greatest of care, is always attended with the risk of adding a new pest to our fauna.

To centralize the work and eliminate the disadvantages of the old system it was decided to erect a new building in which all the inspection work could be performed. Land was set aside on Kekuanaoa Street by the Governor and the new building was ready for occupation by the end of 1917. Since that time all work pertaining to the inspection of plants has been carried on at the new station.

Sufficient funds were not available to complete a building of the desired specifications and the Hawaiian Sugar Planters' Association generously came to our assistance with a substantial appropriation which assured the success of the undertaking.

STAFF.

During the biennial period the Division of Plant Inspection had four members at Honolulu as follows:

E. M. Ehrhorn as Chief Plant Inspector, D. B. Langford as Assistant Inspector, Edward Drew and Isaac Kahele as Inspector's assistants. On July 5, 1918, Mr. Kahele was drafted for service in the army and Mr. Minoru Mito was engaged in his place during the period of the war.

At Hilo, Brother Matthias Newell has continued as Fruit and Plant Inspector, and has been very faithful in the performance of his duties. On January 1, 1917, Mr. Will J. Cooper was appointed Fruit Inspector at Kahului, Maui. This was found necessary on account of the congestion at the Port of Honolulu owing to war conditions. Since taking up the work Mr. Cooper has found several shipments of turnips infested with the raddish maggot and had them destroyed.

Mr. E. E. Madden, Mahukona, Hawaii; Mr. Geo. B. Leavitt, Eleele, Kauai; and Mr. G. C. Munro, Keomoku, Lanai, are acting as Honorary Inspectors for these places and as all produce for the smaller ports is held and examined at the port of Honolulu these

gentlemen act only as a safeguard for possible infractions of our rules and regulations.

BUILDINGS AND EQUIPMENT.

The new buildings of the Division of Plant Inspection consist of an administration building and fumigating units. The administration building is of reinforced concrete and is provided with a general office, Chief Plant Inspector's office, library, laboratory, plant room and quarantine room with attached incinerator.

The laboratory is equipped with the most improved scientific instruments and apparatus necessary for the performance of work incidental to inspection; mounting, preserving and identifying insects collected in inspection, preserving and mounting specimens for record and exhibition and for sterilizing infected materials. There is a growing reference library pertaining principally to economic entomology and plant diseases which is indispensable for the purpose of keeping apace with the discoveries and problems met with by entomologists in other parts of the world and which enables us to be on guard for new pests that appear in countries with which we are in communication by steamer.

The plant room is designed for the safe and efficient examination of all plant shipments and the danger of escape of insects is reduced to a minimum. Provision is made for making the room air-tight in order that it may be used for fumigation in case of emergency. Adjacent to the plant room is an incinerator in which infested or diseased plants, fruit, packing or other dangerous material is burned. The incinerator is heated with a rotary crude oil burner to a temperature of 2000° Fahr.

The quarantine room is constructed with a low ceiling to facilitate the capture of any insect which may escape during examination. Plant shipments that show indications of dangerous insects are first opened in this room; however, shipments showing infestation of dangerous pests are immediately destroyed by burning.

The two fumigating units are in a separate building also of reinforced concrete with a capacity of 2,500 cubic feet and 3,800 cubic feet, respectively. The doors are specially designed to prevent the leakage of gas.

VESSELS TOUCHING AT HONOLULU.

Every vessel touching at Honolulu from foreign and mainland ports is met and boarded as soon as it reaches the wharf. Foreign ships are likely to have on board fruit or vegetables for consumption on the voyage or growing plants in transit or for purposes of decoration. These are frequently infested with insects

which are always a source of danger from their hatching on board and getting ashore where abundant vegetation for their reception is to be found adjacent to the waterfront. A thorough search is made of these vessels, and if in our judgment any part of their cargo is liable to harbor insects, immediate steps are taken for our protection. Copies of the laws and regulations of the Board of Agriculture and Forestry as well as those of the Federal Horticultural Board are supplied to the proper authorities on all vessels in order that they may be fully acquainted with the requirements of the Territory in these matters and take the necessary precautions as well as to avoid inconvenience and delay to themselves.

INSPECTION OF PLANTS.

Immediately on arrival, all consignments of plants are taken to the Plant Inspection building and subjected to a rigid examination, the soil removed from the roots and when necessary replaced with moss or sterilized soil. When evidence is found of infestation by insects or disease they are at once treated before delivery or burned as the case warrants.

POST OFFICE INSPECTION.

Visits to the Post Office are made daily or more frequently if necessary and each parcel of seeds, fruits or plants is examined and proper treatment accorded those found infested. Here again we are very fortunate in having the hearty cooperation of the Postmaster and his assistants. A special locker is set aside for all packages containing plants, seeds and other vegetable matter and these are deposited therein, and are held until passed by the Plant Inspector.

PLANT AND FRUIT INSPECTION.

During the biennial period 1,433 vessels arriving at the ports of Honolulu, Hilo and Kahului were inspected. Of this number 614 vessels carried vegetable matter consisting of 24,843 lots and 566,268 packages. Of this amount 577,261 packages were fruit and vegetables mostly from the mainland of the United States and imported for consumption, 4,296 packages were seeds of trees, flowers, vegetables and cereals and 4,691 packages were plants.

From these shipments 1,314 packages were destroyed by burning, 4,729 packages were fumigated before delivery and 964 packages were returned to the shipper on account of being infested with insect pests or fungus diseases or being contraband under the rulings of the Federal Horticultural Board of Washington, D.C., of which the writer, Mr. D. B. Langford and Mr. Edward Drew are Collaborators.

Plate 7.

Fig. 1. Rear of New Plant Inspection Building, Honolulu, Showing Incinerator.

Fig. 2. New Fumigating Units.

The tables in the appendix give a summary of the inspection work performed at Honolulu, Hilo and Kahului, as well as the Inter-Island Inspection (see Appendix, Nos. 1 to 12).

RICE AND BEAN SHIPMENTS.

Rice and beans being the staple food of our large Oriental population, it follows that imports of these commodities are very extensive and their inspection is of considerable importance. The imports of rice and beans for the years 1917-1918 amounted to 771,746 bags of rice and 61,435 bags of beans. With the exception of a few small shipments which were thoroughly fumigated before delivery was allowed, rice and beans were of good quality and free from insect pests.

In past years considerable difficulty has been experienced especially with rice and beans of the old crop being infested with the various moths and beetles that affect stored cereals. With our limited facilities for the fumigation of large quantities of these products, their disposal constituted a difficult problem. The amended Rule III of the Board of Agriculture and Forestry as amended June 8, 1918, so as to require the fumigation of all rice at the port of debarkation has materially improved the situation.

AUSTRALIAN WHEAT.

Several large consignments of wheat from Australia were slightly infested with the Lesser Grain Borer, *Rhizopertha dominica*. Fortunately we were able to fumigate it at once and prevent the introduction of this pest to the warehouses of Honolulu.

INSPECTION OF IMMIGRANTS' BAGGAGE.

One of the very important duties of this Division is the examination of the baggage of immigrants. These people, principally Orientals, almost invariably have in their possession packages of sugar cane, fruit, vegetables and frequently plants brought for food or as presents to friends in Honolulu. Singing crickets in cages, leeches, snails and various other creatures are met with from time to time. Such belongings are decidedly more dangerous than those we would ordinarily expect to find in regular commercial consignments for the reason that they usually come from the small plots of Oriental homes where there is seldom the knowledge or facility for the control of noxious insects.

Through the courtesy of the U. S. Customs and Immigration inspectors we are able to examine thoroughly every piece of baggage belonging to immigrants and burn all suspicious packages.

During the past biennial period approximately 108,416 pieces

of such baggage were examined from which 676 lots of fruit, vegetables, etc., were taken and destroyed.

INTER-ISLAND INSPECTION.

The usual inspection of horticultural products consigned to other island ports has been continued. With the improved facilities for inspection it is now possible to control the shipments of soil on the roots of plants and thereby minimize the danger of the spread of insects and diseases not yet established on the other islands. The Hawaiian Sugar Planters' Experiment Station has been authorized to attend to the inspection of sugar cane for planting on the various plantations of the islands and no sugar cane is received for shipment unless examined and certified by them. All sugar cane which is found in the possession of the traveling public is confiscated and destroyed. In this way we hope to prevent the spread of cane diseases from the Island of Oahu to any of the other islands.

During the biennial period 1,396 steamers plying between Honolulu and ports of the other islands were attended to and 24,114 packages of plants, fruits and vegetables were inspected. Of this number 330 packages were rejected either on account of infestation or having undesirable soil attached to the roots of plants.

FUMIGATION.

Since moving to the new building on Kekuanaoa Street, in addition to fumigating shipments of rice and other cereals from foreign ports, we have been able to fumigate a large amount of grain and other stored food products which have become infested while in storage in Honolulu. The cost of the chemicals used for such fumigation was paid by the owner and not by this Division. As local merchants realize more and more the importance of keeping such commodities free from insect infestation the demand for this work is rapidly increasing. The Quartermaster Department of the U. S. Army frequently calls upon us to handle quantities of flour and rice that taxes us to the limit of our ability. In case of an outbreak of some contagious disease when bedding and personal effects would require fumigation this is the only Territorial institution available for work of this nature.

It has always been the policy of this Division to cooperate in every way with federal, territorial and other institutions when the results are for the good of the Territory at large. Constant vigilance is necessary to guard this Territory from invasion of injurious insects and plant diseases, and if we are to continue this policy it is of the utmost importance that more units be added to the fumigating plant as soon as possible.

PESTS INTERCEPTED IN INSPECTION.

In addition to our improved facilities for carrying on the work of inspection two factors have contributed to lessen the danger of introducing destructive pests: the war, which reduced shipping accommodations, and the rigid restrictions imposed upon horticultural importations by the Federal Horticultural Board. Notwithstanding these factors we have intercepted and destroyed numerous insects and diseases some of which were they to secure a foothold in the Territory would seriously interfere with our agricultural industries.

The principal media for the carrying of insects and plant diseases are plants and soil and the moss or other material in which they are packed, grain and other stored food products, and fruit and vegetables which arrive by freight, mail and baggage. Naturally the great bulk of imports come by freight but the articles found in the mail and baggage are the most prolific carriers of unwelcome visitors and require the greatest care in their detection. Commercial shipments almost invariably are thoroughly inspected at the place of origin, and infested products are rarely presented for shipment, while mail and baggage, more particularly the former, come from every part of the globe, and the possibilities of infestation are legion. Following are interceptions which deserve particular mention:

Pineapple Mite, *Stigmaeus floridanus.*

This pest was discovered in a consignment of pineapple suckers in the mail from Florida. In addition to the damage caused by the feeding of the insect, it is said to be the means of carrying dangerous plant diseases which gain access to the tissues of the leaf through its punctures.

Argentine Ant, *Iridomyrmex humilis.*

Specimens of this dreaded pest were discovered in the soil on the roots of a consignment of plants from California.

Curculionid Beetle.

In the Orient the grubs of a beetle of this family subsist on the roots of *Thuya orientalis* and *Azalea,* and being under ground control measures are difficult. Many larvae of this beetle were taken from the roots of potted plants from Japan.

White Fly, *Aleyrodes citri.*

This insect causes immense damage to citrus crops in countries where it has become established, and growers are annually put to great expense and labor to keep the pest in check. The white fly was found on citrus plants from Japan.

White Ants, *Termites.*

The white ant is at present well known in Honolulu especially to owners of wooden buildings. Fortunately the most destructive species which attack living plants in the Philippines, East Indies and Polynesia have not gained a foothold in Hawaii. Only recently we burned a large colony discovered in a consignment of yams and banana shoots from Manila.

On plants, in soil and other materials we have record of taking in course of inspection 10 species of scale insects, *Coccidae;* 9 species of beetles, *Coleoptera;* 4 species of moths and butterflies or their larvae; *Lepidoptera*; 18 species of ants, *Hymenoptera,* 12 species of roaches and grasshoppers, *Orthoptera,* 16 species of miscellaneous other insects and 6 species of fungus diseases; on fruit and vegetables we have found 9 species of scale insects, 3 species of moths and 6 species of various other insects; on grain and other stored food products, 7 species of beetles and 4 species of moths, making a total of 104 species. In addition to the insects noted, centipedes, scorpions, pill bugs, slugs and snails, and on one occasion, leeches have been taken from different shipments arriving in the Territory.

RULES AND REGULATIONS.

During the past biennial period the following changes have been made in the rules and regulations of the Board of Agriculture and Forestry which pertain to this Division:

Rule I.—Rule 1, which deals with general inspection, was amended June 8, 1918, to broaden the power of this Division and to comply with the rules and regulations of the Federal Horticultural Board, and includes shipments of plants, fruit, seeds, etc., from the mainland as well as from foreign countries (see Appendix No. 13).

Rule III.—Rule III was amended June 8, 1918, to require all rice shipments from Japan to be fumigated at the port of debarkation before they are accepted for shipment (see Appendix No. 14).

Rule XIX—It has recently been discovered that a beetle, *Metamasius ritchei,* Marshall, is doing serious damage to pineapples in Jamaica. In order to give ample protection to the pineapple industry from the ravages of this insect, Rule XIX was approved by the Governor June 8, 1918. This prohibits the importation of pineapple plants or suckers from the West Indies and Central America including the Canal Zone (see Appendix No. 15).

While under Rule I we are given perfect control over the introduction of plant shipments we believe that when a serious pest is known to occur in a certain locality menacing an industry, specific rules regulating the importation of the article in question will preclude the possibility of introducing its pests.

Plate 8.

Fig. 1. Plant Room Laboratory in New Plant Inspection Building.

Fig. 2. Chief Plant Inspector's Office, Honolulu.

Copies of the rules of this Division have been sent to all nurserymen and seed stores who have shipped seeds or plants into the Territory during the past two years.

FEDERAL HORTICULTURAL BOARD.

The Federal Horticultural Board, of which members of this Division are Collaborators, continues invaluable in its assistance in cooperation with our department. The fact that the importation of plants, seeds and other plant products are under federal control is an incentive to importers to exercise extreme care in the quality of their selections of nurserystock. The regulations of this Board have caused all progressive foreign countries to institute an efficient system of inspection of nursery stock under government supervision. This immediately produces a marked improvement in the quality of their horticultural exports and naturally gives greater security from the danger of a foreign insect pest or disease gaining admission to this Territory.

We have been in correspondence with the Federal Horticultural Board and the post office department and have succeeded in securing permission to destroy parcels of prohibited plants, seeds, etc., arriving by mail and which are found to be infected with dangerous insects or diseases. Heretofore we were allowed to fumigate such parcels, but it was required by law to return them to the country of origin. Ordinarily fumigation is sufficient to destroy insect life, but there is always the possibility that some pest will escape in the post office, make its way to the open and become established. When such articles are burned at once no escape is possible.

The following Notices of Quarantine and other restrictive orders have been issued by the Federal Horticultural Board since January 1, 1917:

Notice of Quarantine No. 26, effective June 1, 1917:

Prohibits the interstate movement of five-leaved pines, currant and gooseberry plants from all states east of and including the States of Minnesota, Iowa, Missouri, Arkansas, and Louisiana to all points outside this area; prohibits further the interstate movement of five-leafed pines and black currant plants to points outside the area comprising the States of Maine, Vermont, Massachusetts, New Hampshire, Rhode Island, Connecticut and New York on account of the white-pine blister rust.

Notice of Quarantine No. 27; Superseded or Revoked.

Notice of Quarantine No. 28, effective Aug. 1, 1917:

Prohibits the importation from eastern and south-eastern Asia (including India, Siam, Indo-China and China), the Malayan Archipelago, the Philippine Islands, Oceanica (except Australia, Tasmania and New Zealand), Japan (including Formosa and other islands adjacent to Japan), and the Union of South Africa, of all species and varieties of

Citrus fruits, on account of citrus canker, except that oranges of the mandarin class (including satsuma and tangerine varieties) may be imported on compliance with the conditions prescribed in the regulations of the Secretary of Agriculture.

Notice of Quarantine No. 29; effective Jan. 1, 1918.

Prohibits the importation for any purpose of any variety of sweet potatoes or yams (*Ipomea batatas* and *Discorea spp.*) from all foreign countries and localities, on account of the sweet potato weevil, *Cylas spp.* and the sweet potato scarabee, *Euscepes batatae.*

This notice of quarantine does not apply to Hawaii and Porto Rico.

Notice of Quarantine No. 30; effective Jan. 1, 1918.

Prohibits the movement from the Territories of Hawaii and Porto Rico into or through any other Territory, State or District of the United States of all varieties of sweet potatoes and yams (*Ipomea batatas* and *Discorea spp.*) regardless of the use for which same are intended, on account of the sweet potato weevil (*Cylas formicarius*) and the sweet potato scarabee, *Euscepes batatae.*

Notice of Quarantine No. 31; effective April 1, 1918.

Prohibits the importation for any purpose of any species or variety of banana plants, *Musa spp.* from all foreign countries and localities, on account of the banana root borer, *Cosmopolites sordidus.*

This notice does not apply to Hawaii and Porto Rico.

Notice of Quarantine No. 32; effective April 1, 1918.

Prohibits the movement from the Territories of Hawaii and Porto Rico into or through any other Territory, State or District of the United States of any species or variety of banana plants regardless of the use for which they are intended, on account of two injurious weevils, *Rhabdocnemis obscurus* and *Metamisius hemipterus.*

Notice of Quarantine No. 33, effective July 1, 1918.

Regulates the movements interstate to any point outside the quarantine towns and territory, or from points in the generally infested area to points in the lightly infested area, of stone or quarry products and of the plants and plant products listed therein. The quarantine covers portions of the New England States.

Notice of Quarantine No. 34, effective Oct. 1, 1918.

Prohibits the importation for any purpose of any variety of bamboo seed, plants or cuttings thereof capable of propagation, including all genera and species of the tribe *Bambusae*, from all foreign countries and localities, on account of dangerous plant diseases, including the bamboo smut, *Ustilago shiraian.* This quarantine does not apply to bamboo timber consisting of the mature dried culms or canes which are imported for fishing rods, furniture-making, or other purposes, or to any kind of article manufactured from bamboo, or to bamboo shoots cooked or otherwise preserved.

Notice of Quarantine No. 35, effective June 1, 1919.

Regulates the movement interstate to any point outside the townships of Delran, Chester, and Cinnaminson, Burlington County, New Jersey, of green corn, commonly called sweet or sugar corn, on account of the Japanese Beetle, *Popilia japonica.*

Notice of Quarantine No. 36, effective Oct. 1, 1918.

Prohibits the movement interstate to any point outside of the quarantined area of corn fodder, roasting ears, corn on the cob and corn cobs on account of the European corn borer, *Pyrausta nubilalis.*

Prohibits the movement interstate to any point outside of the quarantined area of corn fodder, roasting ears, corn on the cob and corn cobs on account of the European corn borer, *Pyrausta nubilalis*.

Other Restrictive Orders.

The order of March 1, 1917 (Amendment No. 1 with Regulations to Notice of Quarantine No. 24), prohibits the importation of Indian corn or maize in the raw or unmanufactured state from the countries and localities listed in Notice of Quarantine No. 24, except under permit and in accordance with the other provisions of the regulations issued under said order, on account of injurious diseases of Indian corn.

The order of June 23, 1917, prohibits the importation of cotton-seed cake, meal, and other cotton seed products, except oil, from all foreign countries, and a second order of June 23, 1917, prohibits the importation of cotton seed oil from Mexico except under permit and in accordance with the other provisions of the regulations issued under said orders, on account of injurious insects including the pink bollworm.

The order of June 27, 1917 (Notice of Quarantine No. 28 with Regulations), prohibits the importation from the countries and localities listed therein of all species and varieties of Citrus fruits, excepting only oranges of the mandarin class (including satsuma and tangerine varieties), on account of the citrus-canker disease. Oranges of the mandarin class (including satsuma and tangerine varieties) may be imported under permit and in accordance with the other provisions of the regulations issued under said order.

Respectfully submitted,

EDW. M. EHRHORN,
Chief Plant Inspector.

APPENDIX NO. 2.
HILO INSPECTION
1917

Month.	Vessels Inspected	Vessels Carrying Veg. Matters	PASSED			Burned	TOTAL INSPECTED		Seeds	Plants	Cabbages	Celery	Lemons	Onions	Oranges	Potatoes	Rice	Beans
			Lots	Parcels	Fumigated		Lots	Parcels										
Jan.	7	4	193	3,293	....	....	193	3,293	10	9	....	14	87	240	818	916	.....	.....
Feb.	7	5	228	2,202	....	....	228	2,202	4	6	....	9	7	346	458	761	1,550	296
Mar.	7	4	207	3,522	....	....	207	3,522	8	15	....	4	40	132	912	1,406	.....	....
Apr.	6	4	120	1,391	....	....	120	1,391	4	6	....	....	25	99	500	460	1,190	239
May	7	4	126	2,196	....	....	126	2,196	9	13	....	4	37	37	227	905	.....	.....
June	9	5	210	2,013	....	....	210	2,013	1	3	1	....	45	25	819	318	4,852	268
July	8	4	214	2,167	....	....	214	2,167	....	....	1	12	31	242	549	384	.....	.....
Aug.	7	2	163	2,063	....	....	163	2,063	12	4	1	5	29	367	347	592	3,474	237
Sept.	5	3	167	2,441	1	....	168	2,442	....	3	....	8	45	353	398	848	.....	.....
Oct.	9	4	167	3,286	....	....	167	3,286	4	....	....	9	41	683	111	1,323	3,735	309
Nov.	9	2	160	3,039	....	1	161	3,040	....	1	....	9	28	348	518	802	.....	.....
Dec.	7	3	143	3,762	....	....	143	3,762	1	....	1	6	33	387	1,068	825	2,500	285
Total	88	44	2,098	31,375	1	1	2,096	31,377	58	60	4	70	398	3,259	6,715	9,535	17,301	1,634

HILO INSPECTION
1918

Month.	Vessels Inspected	Vessels Carrying Veg. Matters	PASSED		Fumigated	Burned	Seeds	Plants	TOTAL INSPECTED			Cabbages	Celery	Lemons	Onions	Oranges	Potatoes	Rice	Beans
			Lots	Parcels					Lots	Parcels	Apples								
Jan.	2	2	116	2,554	....	....	....	1	116	2,554	429	....	3	16	307	558	1,155	.....	.....
Feb.	4	2	88	1,623	....	....	....	....	88	1,623	276	....	6	7	169	281	832	4,304	149
Mar.	5	1	72	1,416	....	....	....	4	72	1,416	106	....	3	5	143	284	817	.....	.....
Apr.	6	3	118	2,090	....	....	....	....	118	2,090	385	....	4	16	319	270	972	900	569
May	5	2	82	1,896	....	....	18	2	82	1,896	379	....	....	9	361	189	885	.....	.....
June	4	1	107	2,470	....	....	5	1	107	2,470	21	....	1	28	380	287	1,502	.....	.....
July	4	1	110	2,316	....	....	....	....	110	2,316	33	....	4	19	527	305	1,228	.....	.....
Aug.	7	3	142	2,344	....	....	....	....	142	2,344	640	....	9	24	443	238	723	2,281	596
Sept.	6	2	121	1,795	....	....	....	....	121	1,795	415	....	4	25	608	90	381	.....	.....
Oct.	5	3	152	2,412	1	2	2	3	153	2,415	1,142	2	28	6	251	43	630	2,980	579
Nov.	5	2	97	2,861	....	....	....	....	97	2,861	984	....	....	6	311	24	1,305	.....	.....
Dec.	4	3	152	3,762	....	....	....	....	152	3,762	1,153	....	6	33	387	1,063	825	2,500	259
Total	57	25	1,357	27,539	1	2	20	11	1,360	27,542	4,953	2	48	194	4,306	3,632	11,255	12,965	2,152

APPENDIX NO 8.

KAHULUI INSPECTION
1917

Month.	Vessels Inspected	Vessels Carrying Vegetable Matters	PASSED		Burned	Plants	TOTAL INSPECTED		Celery	Lemons	Onions	Oranges	Potatoes
			Lots	Parcels			Lots	Parcels					
Jan.	14	2	76	581	....	....	76	581	18	3	115	127	135
Feb.	16	2	78	511	....	2	78	511	1	7	45	129	141
Mar.	11	2	49	305	....	....	49	305	1	15	8	114	18
Apr.	13	2	61	373	....	....	61	373	5	7	27	117	75
May	12	3	58	421	....	....	58	421	4	7	4	251	45
June	24	3	80	625	4	2	82	629	9	15	....	357	69
July	16	2	52	489	4	....	53	493	6	10	20	212	24
Aug.	11	3	48	319	2	....	49	321	6	2	20	97	32
Sept.	13	3	90	779	3	5	91	782	11	9	77	98	259
Oct.	11	3	79	709	1	....	80	710	13	10	47	130	175
Nov.	13	2	75	699	....	2	75	699	8	10	98	107	110
Dec.	3	1	74	762	....	....	74	762	....	12	63	150	198
Total.....	157	28	815	6,573	14	11	821	6,587	77	107	519	1,889	1,276

KAHULUI INSPECTION
1918

Month.	Vessels Inspected	Vessels Carrying Vegetable Matters	PASSED		Plants	TOTAL INSPECTED		Apples	Celery	Lemons	Onions	Oranges	Potatoes
			Lots	Parcels		Lots	Parcels						
Jan.	7	3	64	1,007	....	64	1,007	301	2	6	169	185	327
Feb.	6	2	38	451	4	38	451	147	1	4	93	107	89
Mar.	5	2	44	314	....	44	314	90	1	2	53	89	69
Apr.	3	2	17	185	1	17	185	60	1	2	14	52	52
May	5	3	50	673	1	50	673	145	....	8	85	132	261
June	2	2	52	707	....	52	707	....	....	5	84	101	476
July	5	2	50	344	....	50	344	5	....	8	89	41	126
Aug.	6	3	28	144	....	28	144	50	....	5	8	68	8
Sept.	5	1	4	58	....	4	58	55	....	1	....	....	....
Oct.	3	1	29	295	....	29	295	135	....	4	95	11	32
Nov.	4	1	9	520	....	9	520	195	....	10	153	5	130
Dec.	7	1	5	319	....	5	319	148	....	5	33	33	95
Total.....	51	23	390	5,017	6	390	5,017	1,126	5	60	876	824	1,665

APPENDIX NO. 4.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1917.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	1,514	1,234	2,362	1,033	472	105	1,230	4,218	11,696	13,875	19,400	2,337	59,476
Apricots	.....	.....	.....	.....	15	512	804	17	2	.....	.....	.....	1,350
Artichokes	30	35	63	35	64	26	35	12	3	.....	13	7	323
Beans	10	.....	9	2	.....	2	.....	4	.....	.....	34	20	81
Cabbage	42	12	52	10	2	.....	11	152	245	171	301	149	1,147
Cabbage (pake)	5	1	.....	.....	.....	.....	2	9	15	15	44	44	135
Beets	2	5	11	40	3	1	15	18	19	9	20	24	177
Carrots	5	5	2	7	1	15	10	20	30	18	65	33	212
Cauliflower	355	313	376	209	279	262	310	385	258	237	393	20	3,392
Celery	172	124	106	77	61	94	127	252	205	310	350	79	1,957
Cherries	.....	.....	.....	.....	1,225	1,503	1,781	285	.....	.....	.....	.....	4,744
Celery Root	.....	8	2	4	.....	.....	.....	3	.....	.....	.....	.....	17
Cranberries	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	34	32	78
Asparagus	.....	.....	27	59	114	36	28	.....	.....	.....	.....	2	256
Fruit	77	76	46	44	33	44	56	78	73	65	59	110	756
Grape Fruit	173	180	315	134	239	160	180	173	136	107	187	197	2,181
Garlic	59	87	87	31	95	33	87	68	87	52	18	43	697
Grapes	.....	.....	.....	.....	.....	.....	.....	833	2,635	2,083	4,349	81	9,981
Horse Radish	3	6	6	2	6	1	6	2	3	10	4	1	50
Lemons	454	366	1,139	231	657	200	361	629	581	917	516	355	6,351
Megs	.....	.....	.....	.....	70	38	43	790	692	448	155	7	2,243
Melons	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21	.....	21
Nectarines	.....	.....	.....	.....	.....	.....	.....	575	278	.....	.....	.....	853
Nuts	32	38	15	4	7	12	14	27	10	7	34	31	231
Onions	1,826	774	140	56	11	181	760	4,407	3,573	1,291	556	1,518	15,093
Oranges	9,374	3,669	4,776	2,583	4,423	2,299	2,796	2,224	2,003	2,473	3,783	3,101	43,504
Parsnips	7	7	12	8	8	7	8	20	7	12	20	6	122
Peas	12	1	12	56	68	66	1	63	10	14	4	.....	307
Peaches	.....	.....	.....	1	.....	910	1,016	1,307	1,776	666	122	.....	5,798
Rhubarb	26	40	61	65	106	69	40	26	8	16	16	3	476
Pears	44	18	2	2	.....	5	10	1,082	1,074	1,041	546	213	4,037
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	220	676	.....	896
Plants	69	84	91	69	73	59	92	30	21	22	15	32	656
Plumes	.....	.....	.....	.....	.....	412	872	1,887	788	548	.....	.....	4,507
Prunes	.....	.....	.....	.....	.....	.....	.....	9	.....	1	.....	.....	10
Quinces	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Seeds	74	86	138	98	136	62	86	40	27	34	76	82	934
Sprouts	48	31	9	.....	.....	.....	31	2	2	5	19	.....	147
Potatoes	8,896	7,630	7,675	5,148	4,046	3,457	5,614	9,881	7,100	8,352	12,259	7,375	87,488
Squash	2	3	.....	.....	.....	1	3	2	3	8	18	10	50
Sweet Potatoes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	.....	40
Tangerines	2,445	908	367	265	390	78	408	.....	.....	.....	.....	639	5,500
Tomatoes	.....	.....	10	44	.....	.....	.....	1	.....	1	60	100	216
Turnips	19	54	43	59	40	28	29	59	42	39	112	60	584
Trees	1	1	1	10	1	1	1	3	.....	.....	.....	185	204
Vegetables	136	176	139	52	47	54	176	132	96	58	97	6	1,169
Bulbs	26	32	30	29	10	10	32	5	.....	22	44	28	268
Total	25,928	15,994	18,124	10,462	12,701	10,748	17,025	29,725	33,418	33,151	44,450	16,041	

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1918.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	2,432	2,162	1,843	2,163	1,100	96	108	2,570	1,627	9,252	15,258	8,781	47,892
Apricots	.....	.....	.....	.....	.....	196	87	.....	.....	.....	.....	.....	283
Artichokes	6	7	18	15	10	12	.....	.....	.....	5	.....	4	77
Beans	.....	.....	.....	.....	.....	35	.....	.....	.....	.....	.....	.....	35
Cabbage	40	28	6	5	.....	.....	10	52	17	39	30	14	241
Cabbage (Pake)	47	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	59
Asparagus	.....	.....	1	14	28	32	2	.....	.....	.....	.....	2	74
Carrots	7	45	26	5	.....	15	.....	10	20	30	5	15	178
Cauliflower	70	36	80	50	16	95	10	2	.....	.....	.....	79	438
Celery	59	38	66	14	2	6	11	1	.....	39	1	125	362
Celery Root	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Cherries	.....	.....	.....	.....	140	954	260	.....	.....	.....	.....	.....	1,354
Cranberries	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52	58	110
Beets	5	53	30	5	21	35	10	20	20	25	10	15	249
Fruit	37	21	45	7	13	7	24	34	10	16	6	7	227
Garlic	29	4	28	30	19	37	33	93	67	22	20	13	389
Grape Fruit	79	86	127	196	190	156	300	166	67	75	178	112	1,732
Grapes	5	23	.....	.....	.....	.....	.....	6	8	542	1,131	181	2,162
Horse Radish	1	2	1	2	3	2	1	.....	.....	.....	2	1	15
Lemons	197	268	441	424	238	189	462	617	172	315	434	274	4,031
Megs	.....	.....	.....	.....	.....	37	49	104	18	155	73	.....	436
Nuts	.....	.....	.....	.....	20	11	21	14	.....	20	157	118	361
Onions	1,278	1,491	2,320	2,458	1,368	883	,1886	4,106	1,633	2,372	2,196	2,652	24,643
Oranges	4,555	2,168	847	986	738	887	1,008	1,343	307	2,358	288	2,220	17,705
Parsnips	12	25	16	16	26	24	16	20	2	10	2	20	189
Peas	.....	.....	.....	.....	11	9	.....	.....	.....	.....	10	.....	30
Peaches	.....	.....	.....	.....	.....	143	200	31	.....	22	3	.....	399
Rhubarb	2	3	7	6	13	10	1	.....	.....	5	.....	18	65
Pears	90	20	30	.....	.....	.....	61	68	53	768	198	50	1,388
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	.....	.....	84
Plants	37	199	19	49	40	22	12	159	3	8	19	11	578
Plums	.....	.....	.....	.....	.....	10	175	140	2	.....	.....	.....	327
Prunes	.....	.....	.....	.....	.....	3	16	.....	.....	.....	.....	.....	19
Seeds	24	74	60	83	47	86	51	33	31	50	15	45	549
Sprouts	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	8
Potatoes	6,727	9,286	7,691	11,636	4,752	5,757	5,803	9,040	4,140	6,033	10,263	8,440	89,568
Squash	3	4	1	2	4	5	.....	.....	.....	10	32	16	75
Quinces	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Tangerines	576	632	683	150	.....	.....	.....	.....	.....	.....	12	,055	3,108
Tomatoes	7	.....	35	60	.....	.....	.....	.....	.....	.....	.....	.....	102
Turnips	26	78	66	68	67	78	54	44	3	26	23	43	576
Trees	2	4	2	.....	.....	.....	.....	.....	.....	.....	.....	167	175
Vegetables	9	.....	7	1	.....	2	.....	.....	.....	1	.....	1	21
Bulbs	1	4	.....	17	12	1	2	.....	2	.....	.....	12	52
Total	16,421	16,982	14,497	18,460	8,867	9,785	10,673	18,673	8,202	22,282	30,419	24,557	199,818

APPENDIX NO. 6.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1917

(FOREIGN)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	23	6	17	8	22	7	2	5	2	5	6	7	110
Asparagus	5	3	2	5	13	2	2	.....	.....	.....	2	4	38
Beans	53	.....	600	.....	.....	40	.....	42	275	30	24	110	1,174
Bamboo Shoots	.....	.....	.....	1	11	1	.....	.....	.....	.....	2	.....	15
Caladiums	89	.....	3	.....	.....	.....	.....	.....	.....	.....	1	.....	93
Chestnuts Gr.	40	15	10	8	6	.....	10	.....	.....	.....	365	1	455
Chestnuts, Water	87	22	80	34	41	7	12	21	29	7	40	40	370
Cocoanuts	.....	.....	.....	.....	6	.....	.....	150	.....	25	.....	218	399
Fruit	1	12	1	5	2	.....	2	1	4	1	8	2	39
Garlic	21	4	8	28	107	13	4	9	10	3	15	6	228
Grape Fruit	4	.....	2	3	12	5	.....	3	1	1	1	.....	37
Gingers	29	17	11	15	37	1	10	16	3	5	15	17	176
Horse Radish	5	3	2	3	9	2	1	1	1	3	3	3	36
Lemons	5	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Yams	71	30	14	19	49	13	20	20	37	5	58	37	373
Nuts	5	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	7
Onions	2	703	1,698	4,516	359	1	403	23	2	.....	9	3	7,714
Oranges	27	14	23	11	27	9	10	11	5	3	13	12	165
Olives	1	.....	.....	.....	.....	2	.....	.....	2	.....	.....	.....	5
Pomelos	5	.....	7	1	2	1	.....	.....	.....	.....	.....	2	18
Pomegranates	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	2
Peanuts	282	34	50	.....	275	26	4	100	548	.....	.....	.....	1,319
Plants	9	4	797	40	86	214	4	187	15	.....	16	21	1,393
Sand-pears	10	4	6	2	5	.....	4	.....	2	.....	4	2	39
Quinces	.....	.....	143	.....	.....	.....	.....	.....	.....	.....	.....	.....	143
Seeds	47	92	.....	71	112	16	68	60	65	112	168	104	915
Corn	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	5
Potatoes	37	3	20	12	1,492	.....	1	31	1	.....	1	1	1,599
Wheat	.....	.....	.....	.....	.....	1,500	.....	.....	.....	.....	.....	.....	1,500
Sweet Potatoes	19	4	1	8	17	6	1	3	.....	3	7	3	72
Tangerines	20	1	18	16	9	.....	1	.....	.....	.....	7	11	83
White Nuts	6	5	.....	.....	3	.....	.....	.....	9	.....	12	1	36
Taro	2	1	.....	2	.....	.....	1	.....	.....	1	5	.....	14
Trees	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	2
Vegetables	1	1	9	.....	.....	1	1	1	12	2	15	10	53
Bulbs	58	2	.....	.....	.....	1	2	2	1	.....	17	9	90
Pears	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Total	964	981	3,469	4,809	2,709	562	691	1,024	207	315	626	1,868	— 18,725

APPENDIX NO. 7.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1918
(FOREIGN)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	4	7	5	1	5	3	.....	.....	7	1	1	5	39
Asparagus	6	5	.....	1	4	2	2	.....	.....	.....	.....	.....	20
Bamboo Shoots	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	3
Beans	.....	248	10	115	101	100	40	30	101	294	68	.....	1,107
Chestnuts, Water	47	28	9	65	10	15	12	4	.....	21	36	51	298
Caladiums	.....	42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	42
Carrots	.....	.....	.....	.....	.....	.....	32	26	.....	.....	.....	.....	58
Chestnuts, Gr.	.....	.....	.....	.....	.....	.....	.....	.....	51	.....	.....	.....	51
Cocoanuts	.....	.....	.....	.....	.....	4	.....	8	.....	.....	.....	.....	12
Corn	.....	.....	1	.....	.....	.....	2	.....	.....	.....	.....	.....	3
Fruit	2	3	1	.....	.....	2	.....	.....	5	.....	1	.....	14
Garlic	9	2	4	8	4	7	21	17	7	3	1	11	94
Grape Fruit	.....	1	1	1	4	3	5	3	2	.....	.....	.....	20
Horse Radish	6	4	1	2	2	1	1	.....	2	.....	1	.....	20
Lemons	.....	1	.....	1	.....	1	.....	.....	.....	.....	1	2	6
Limes	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
Gingers	34	2	11	21	4	7	20	20	53	8	9	23	212
Nuts	4	1	6	.....	2	2	5	.....	1	5	.....	4	30
Onions	2	4	137	2	10	1	4	4	2	5	.....	.....	171
Oranges	10	10	9	3	8	7	4	5	4	.....	3	4	67
Peas	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	496	366	865
Parsnips	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Wheat	.....	.....	.....	.....	411	.....	.....	.....	700	302	.....	.....	1,413
Peanuts	114	50	136	20	.....	175	108	146	166	80	.....	.....	940
Pears	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Plants	15	4	47	54	23	4	99	.....	201	1	880	68	1,396
White Nuts	8	7	.....	.....	.....	.....	.....	.....	.....	1	4	.....	20
Pomelo	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	4	2	7
Seeds	100	119	110	51	29	49	140	57	142	85	154	20	1,006
Sand Pears	2	5	1	1	3	2	4	5	3	1	.....	.....	27
Potatoes	1	40	.....	2	1	.....	.....	3	1	.....	.....	.....	48
Sweet Potatoes	5	6	6	8	.....	1	9	2	4	.....	4	.....	45
Tangerines	12	7	11	2	.....	.....	.....	.....	.....	.....	4	4	40
Taro	1	.....	1	.....	.....	.....	.....	.....	.....	.....	2	.....	4
Yams	59	18	4	42	15	.....	29	25	37	3	26	34	292
Vegetables	2	6	.....	1	8	.....	.....	1	.....	3	.....	.....	21
Trees	.....	.....	.....	.....	.....	13	.....	.....	.....	.....	.....	.....	13
Bulbs	8	2	.....	1	1	.....	.....	.....	.....	.....	11	7	30
Total	451	623	511	406	647	400	583	356	1,489	718	1,708	602	8,489

APPENDIX NO. 8.

FRUITS AND VEGETABLES RECEIVED IN HILO DURING 1917.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	873	375	765	161	776	42	291	392	472	803	1,029	1,153	7,132
Apricots	.....	.....	.....	.....	.....	181	46	.....	.....	.....	.....	.....	227
Artichokes	.....	1	1	5	.....	1	.....	.....	1	2	2	1	13
Beans	62	47	24	19	.....	.....	.....	25	.....	20	18	10	225
Cabbage	.....	.....	.....	.....	.....	1	1	1	1	.....	.....	1	5
Asparagus	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	2
Cauliflower	27	21	28	18	24	26	25	8	9	7	15	4	207
Celery	14	9	4	.....	4	.....	12	5	8	9	9	6	80
Cherries	.....	.....	.....	.....	108	117	104	.....	.....	.....	.....	.....	329
Cranberries	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	2
Fruit	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
Garlic	12	12	31	20	5	8	19	24	37	14	15	5	202
Grape Fruit	22	13	31	15	14	11	8	8	12	8	16	15	173
Grapes	32	5	.....	.....	.....	.....	36	57	74	119	74	32	429
Horse Radish	.....	.....	1	2	.....	.....	.....	.....	.....	1	1	1	6
Lemons	37	7	40	25	37	45	31	29	45	41	28	33	398
Megs	3	.....	.....	.....	.....	33	50	28	38	35	7	7	191
Nectarines	.....	.....	.....	.....	.....	15	18	.....	.....	.....	.....	.....	33
Nuts	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	8	12	25
Onions	240	346	132	99	37	25	242	367	358	683	348	387	3,259
Oranges	818	453	912	500	227	819	549	347	398	111	518	1,063	6,715
Parsnips	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2
Peaches	.....	.....	.....	.....	.....	218	117	55	67	10	.....	.....	467
Rhubarb	.....	.....	.....	.....	4	3	4	.....	.....	.....	.....	1	12
Pears	.....	.....	.....	.....	.....	4	60	45	41	30	15	15	210
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	88	5	98
Plants	9	6	15	6	18	3	.....	4	3	.....	1	.....	60
Plums	.....	.....	.....	.....	.....	149	157	45	45	16	.....	.....	412
Pomegranates	.....	.....	.....	.....	.....	.....	.....	.....	3	38	38	.....	79
Quinces	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Seeds	10	4	8	4	9	1	.....	12	.....	4	.....	.....	52
Potatoes	916	761	1,406	460	905	318	384	592	848	1,323	802	825	9,535
Squash	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Tangerines	214	135	112	40	25	.....	6	.....	.....	.....	.....	175	707
Tomatoes	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Turnips	.....	3	8	5	2	2	3	.....	.....	2	3	2	29
Vegetables	4	5	9	7	6	4	4	1	1	3	3	3	55
Total	3,293	2,202	3,522	1,391	2,196	2,013	2,167	2,063	2,442	3,286	3,040	3,762	31,377

APPENDIX NO. 9.

FRUITS AND VEGETABLES RECEIVED IN HILO DURING 1918.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	429	276	106	385	379	21	33	640	415	1,142	984	1,153	5,963
Apricots	.....	.....	.....	.....	.....	6	16	.....	.....	.....	.....	.....	22
Artichokes	1	1	2	1	2	8	1	1	.....	2	.....	1	15
Beans	29	.....	.....	55	30	164	42	11	53	67	63	10	524
Cabbage	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	3
Asparagus	.....	1	1	2	2	10	.....	.....	.....	.....	.....	1	17
Cauliflower	6	.....	2	6	4	4	5	11	5	9	.....	4	56
Celery	3	6	3	4	.....	1	4	9	4	28	.....	6	68
Cherries	.....	.....	.....	.....	.....	20	6	.....	.....	.....	.....	.....	26
Garlic	8	5	4	14	5	4	20	22	16	9	3	5	115
Grape Fruit	7	9	11	9	9	13	11	12	11	16	2	15	125
Grapes	.....	.....	.....	.....	.....	.....	20	12	82	79	89	32	314
Horse Radish	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Lemons	16	7	5	16	9	28	19	24	25	6	6	33	194
Megs	.....	.....	.....	.....	.....	2	18	30	.....	8	.....	7	65
Nectarines	.....	.....	.....	.....	.....	.....	.....	7	.....	.....	.....	.....	7
Nuts	.....	.....	.....	.....	.....	2	.....	5	1	.....	8	12	28
Onions	307	169	143	319	361	380	527	443	608	251	311	387	4,206
Oranges	558	281	284	270	189	287	305	288	90	43	24	1,068	3,682
Peas	.....	1	2	4	2	6	1	10	2	.....	.....	.....	28
Peaches	.....	.....	.....	.....	.....	3	8	58	68	44	.....	.....	181
Rhubarb	.....	1	2	2	1	.....	1	.....	.....	.....	.....	1	8
Pears	5	.....	.....	.....	.....	.....	16	14	16	18	8	15	92
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	.....	5	35
Plants	1	1	4	.....	2	1	1	.....	.....	3	.....	.....	13
Plums	.....	.....	.....	.....	.....	.....	26	63	16	3	.....	.....	108
Pomegranates	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	41	.....	61
Seeds	.....	.....	.....	12	13	5	5	4	.....	2	.....	.....	41
Potatoes	1,155	832	817	972	885	1,502	1,228	728	381	630	1,305	825	11,255
Tangerines	25	80	24	19	.....	.....	.....	.....	.....	.....	15	175	288
Tomatoes	.....	.....	.....	.....	1	2	.....	3	.....	.....	.....	.....	6
Turnips	3	2	4	.....	1	3	2	2	2	2	2	2	28
Vegetables	1	1	2	2	1	3	1	2	.....	1	.....	8	22
Total	2,554	1,623	1,416	2,092	1,896	2,470	2,316	2,344	1,795	2,415	2,861	3,762	27,644

APPENDIX NO. 2.
HILO INSPECTION
1917

Month.	Vessels Inspected	Vessels Carrying Veg. Matters	PASSED		Fumigated	Burned	TOTAL INSPECTED		Seeds	Plants	Cabbages	Celery	Lemons	Onions	Oranges	Potatoes	Rice	Beans
			Lots	Parcels			Lots	Parcels										
Jan.	7	4	193	3,293	....	....	193	3,293	10	9	....	14	37	240	818	916	.....	.....
Feb.	7	5	228	2,202	....	....	228	2,202	4	6	....	9	7	346	453	761	1,550	296
Mar.	7	4	207	3,522	....	....	207	3,522	8	15	....	4	40	132	912	1,406	.....	....
Apr.	6	4	120	1,391	....	....	120	1,391	4	6	....	....	25	99	500	460	1,190	239
May	7	4	126	2,196	....	....	126	2,196	9	13	....	4	37	37	227	905	.....	.....
June	9	5	210	2,013	....	....	210	2,013	1	3	1	....	45	25	819	318	4,852	268
July	8	4	214	2,167	....	....	214	2,167	....	....	1	12	31	242	549	384	.....	.....
Aug.	7	2	163	2,063	....	....	163	2,063	12	4	1	5	29	367	347	592	3,474	237
Sept.	5	3	167	2,441	1	....	168	2,442	....	3	....	8	45	353	398	843	.....	.....
Oct.	9	4	167	3,286	....	....	167	3,286	4	....	....	9	41	688	111	1,323	3,735	309
Nov.	9	2	160	3,039	....	1	161	3,040	....	1	....	9	28	348	518	802	.....	.....
Dec.	7	3	143	3,762	....	....	143	3,762	1	....	1	6	33	387	1,063	825	2,500	285
Total	88	44	2,098	31,375	1	1	2,096	31,377	53	60	4	70	398	3,259	6,715	9,535	17,301	1,634

HILO INSPECTION
1918

Month.	Vessels Inspected	Vessels Carrying Veg. Matters	PASSED		Fumigated	Burned	Seeds	Plants	TOTAL INSPECTED		Apples	Cabbages	Celery	Lemons	Onions	Oranges	Potatoes	Rice	Beans
			Lots	Parcels					Lots	Parcels									
Jan.	2	2	116	2,554	....	....	....	1	116	2,554	429	....	3	16	307	558	1,155	.....	.....
Feb.	4	2	88	1,623	....	....	....	....	88	1,623	276	....	6	7	169	281	832	4,304	149
Mar.	5	1	72	1,416	....	....	....	4	72	1,416	106	....	3	5	143	284	817	.....	.....
Apr.	6	3	118	2,090	....	....	....	....	118	2,090	385	....	4	16	319	270	972	900	569
May	5	2	82	1,896	....	....	13	2	82	1,896	379	....	....	9	361	189	885	.....	.....
June	4	1	107	2,470	....	....	5	1	107	2,470	21	....	1	28	380	287	1,502	.....	.....
July	4	1	110	2,316	....	....	....	....	110	2,316	33	....	4	19	527	305	1,228	.....	.....
Aug.	7	3	142	2,344	....	....	....	....	142	2,344	640	...	9	24	443	238	723	2,281	596
Sept.	6	2	121	1,795	....	....	....	....	121	1,795	415	....	4	25	608	90	381	.....	.....
Oct.	5	3	152	2,412	1	2	2	3	153	2,415	1,142	2	28	6	251	43	630	2,980	579
Nov.	5	2	97	2,861	....	....	....	....	97	2,861	984	....	....	6	311	24	1,305	.....	.....
Dec.	4	3	152	3,762	....	....	....	....	152	3,762	1,153	....	6	33	387	1,063	825	2,500	259
Total	57	25	1,357	27,539	1	2	20	11	1,360	27,542	4,953	2	48	194	4,306	3,632	11,255	12,965	2,152

APPENDIX NO 8.

KAHULUI INSPECTION
1917

Month.	Vessels Inspected	Vessels Carrying Vegetable Matters	PASSED		Burned	Plants	TOTAL INSPECTED		Celery	Lemons	Onions	Oranges	Potatoes
			Lots	Parcels			Lots	Parcels					
Jan.	14	2	76	581	....	....	76	581	18	3	115	127	135
Feb.	16	2	78	511	....	2	78	511	1	7	45	129	141
Mar.	11	2	49	305	....	....	49	305	1	15	8	114	18
Apr.	13	2	61	373	....	....	61	373	5	7	27	117	75
May	12	3	53	421	....	....	53	421	4	7	4	251	45
June	24	3	80	625	4	2	82	629	9	15	....	357	69
July	16	2	52	489	4	....	53	493	6	10	20	212	24
Aug.	11	3	48	319	2	....	49	321	6	2	20	97	82
Sept.	13	3	90	779	3	5	91	782	11	9	77	98	259
Oct.	11	3	79	709	1	....	80	710	13	10	47	130	175
Nov.	13	2	75	699	....	2	75	699	8	10	93	107	110
Dec.	8	1	74	762	....	....	74	762	....	12	68	150	198
Total.....	157	28	815	6,573	14	11	821	6,587	77	107	519	1,889	1,276

KAHULUI INSPECTION
1918

Month.	Vessels Inspected	Vessels Carrying Vegetable Matters	PASSED		Plants	TOTAL INSPECTED		Apples	Celery	Lemons	Onions	Oranges	Potatoes
			Lots	Parcels		Lots	Parcels						
Jan.	7	3	64	1,007	....	64	1,007	301	2	6	169	185	327
Feb.	6	2	38	451	4	38	451	147	1	4	93	107	89
Mar.	5	2	44	314	....	44	314	90	1	2	53	89	69
Apr.	3	2	17	185	1	17	185	60	1	2	14	52	52
May	5	3	50	673	1	50	673	145	....	8	85	132	261
June	2	2	52	707	....	52	707	....	....	5	84	101	476
July	5	2	50	344	....	50	344	5	....	8	89	41	126
Aug.	6	3	28	144	....	28	144	50	....	5	8	68	8
Sept.	5	1	4	58	....	4	58	55	....	1	....	....	....
Oct.	3	1	29	295	....	29	295	135	....	4	95	11	32
Nov.	4	1	9	520	....	9	520	195	....	10	153	5	130
Dec.	7	1	5	319	....	5	319	143	....	5	33	33	95
Total.....	51	28	390	5,017	6	390	5,017	1,126	5	60	876	824	1,665

APPENDIX NO. 4.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1917.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	1,514	1,234	2,362	1,033	472	105	1,230	4,218	11,696	13,875	19,400	2,337	59,476
Apricots	.....	.....	.....	.....	15	512	804	17	2	.....	.....	.....	1,350
Artichokes	30	35	63	35	64	26	35	12	3	.....	13	7	323
Beans	10	.....	9	2	.....	2	.....	4	.....	.....	34	20	81
Cabbage	42	12	52	10	2	.....	11	152	245	171	301	149	1,147
Cabbage (pake)	5	1	.....	.....	.....	.....	2	9	15	15	44	44	135
Beets	2	5	11	40	3	1	15	18	19	9	20	24	177
Carrots	5	5	2	7	1	15	10	20	30	13	65	33	212
Cauliflower	355	313	376	209	279	262	310	385	253	237	393	20	3,392
Celery	172	124	106	77	61	94	127	252	205	310	350	79	1,957
Cherries	.....	.....	.....	.....	1,225	1,503	1,731	285	.....	.....	.....	.....	4,744
Celery Root	.....	8	2	4	.....	.....	.....	3	.....	.....	.....	.....	17
Cranberries	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	34	32	78
Asparagus	.....	.....	27	59	114	36	28	.....	.....	.....	.....	2	256
Fruit	77	76	46	44	33	44	56	73	73	65	59	110	756
Grape Fruit	173	180	315	134	239	160	180	173	136	107	187	197	2,181
Garlic	59	87	87	31	95	33	87	68	37	52	18	43	697
Grapes	.....	.....	.....	.....	.....	.....	.....	833	2,635	2,083	4,349	81	9,981
Horse Radish	3	6	6	2	6	1	6	2	3	10	4	1	50
Lemons	454	366	1,139	231	657	200	361	629	531	917	516	355	6,351
Megs	.....	.....	.....	.....	70	38	43	790	692	448	155	7	2,243
Melons	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21	.....	21
Nectarines	.....	.....	.....	.....	.....	.....	.....	575	278	.....	.....	.....	853
Nuts	32	38	15	4	7	12	14	27	10	7	34	31	231
Onions	1,826	774	140	56	11	181	760	4,407	3,573	1,291	556	1,518	15,093
Oranges	9,374	3,669	4,776	2,583	4,423	2,299	2,796	2,224	2,003	2,473	3,783	3,101	43,504
Parsnips	7	7	12	8	8	7	8	20	7	12	20	6	122
Peas	12	1	12	56	68	66	1	63	10	14	4	.....	307
Peaches	.....	.....	.....	1	.....	910	1,016	1,307	1,776	666	122	.....	5,798
Rhubarb	26	40	61	65	106	69	40	26	8	16	16	8	476
Pears	44	18	2	2	.....	5	10	1,082	1,074	1,041	546	213	4,037
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	220	676	.....	896
Plants	69	84	91	69	72	59	92	30	21	22	15	32	656
Plumes	.....	.....	.....	.....	.....	412	872	1,887	788	548	.....	.....	4,507
Prunes	.....	.....	.....	.....	.....	.....	.....	9	.....	1	.....	.....	10
Quinces	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Seeds	74	86	138	93	136	62	86	40	27	84	76	82	984
Sprouts	48	31	9	.....	.....	.....	31	2	2	5	19	.....	147
Potatoes	8,896	7,630	7,675	5,148	4,046	3,457	5,614	9,881	7,100	8,352	12,259	7,375	87,433
Squash	2	3	.....	.....	.....	1	3	2	3	8	18	10	50
Sweet Potatoes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	.....	40
Tangerines	2,445	908	367	265	390	78	408	.....	.....	.....	.....	639	5,500
Tomatoes	.....	.....	10	44	.....	.....	.....	1	.....	1	60	100	216
Turnips	19	54	43	59	40	28	29	59	42	39	112	60	584
Trees	1	1	1	10	1	1	1	3	.....	.....	.....	185	204
Vegetables	136	176	139	52	47	54	176	132	96	58	97	6	1,169
Bulbs	26	32	30	29	10	10	32	5	.....	22	44	23	268
Total	25,928	15,994	18,124	10,462	12,701	10,743	17,025	29,725	33,413	33,151	44,450	16,941	

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1918.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	2,482	2,162	1,843	2,163	1,100	96	108	2,570	1,627	9,252	15,258	8,781	47,392
Apricots	.....	.....	.....	.....	.....	196	87	.....	.....	.....	.....	.....	283
Artichokes	6	7	18	15	10	12	.....	.....	.....	5	.....	4	77
Beans	.....	.....	.....	.....	.....	35	.....	.....	.....	.....	.....	.....	35
Cabbage	40	28	6	5	.....	.....	10	52	17	39	30	14	241
Cabbage (Pake)	47	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	59
Asparagus	.....	.....	1	14	28	32	2	.....	.....	.....	.....	2	74
Carrots	7	45	26	5	.....	15	.....	10	20	30	5	15	178
Cauliflower	70	36	80	50	16	95	10	2	.....	.....	.....	79	438
Celery	59	38	66	14	2	6	11	1	.....	39	1	125	362
Celery Root	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Cherries	.....	.....	.....	.....	140	954	260	.....	.....	.....	.....	.....	1,354
Cranberries	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52	58	110
Beets	5	53	30	5	21	35	10	20	20	25	10	15	249
Fruit	37	21	45	7	13	7	24	34	10	16	6	7	227
Garlic	29	4	28	30	19	37	33	93	67	22	20	13	389
Grape Fruit	79	86	127	196	190	156	300	166	67	75	178	112	1,732
Grapes	5	23	.....	.....	.....	.....	.....	6	8	542	1,131	181	2,162
Horse Radish	1	2	1	2	3	2	1	.....	.....	.....	2	1	15
Lemons	197	268	441	424	238	189	462	617	172	315	434	274	4,031
Megs	.....	.....	.....	.....	.....	37	49	104	18	155	73	.....	436
Nuts	.....	.....	.....	.....	20	11	21	14	.....	20	157	118	361
Onions	1,278	1,491	2,320	2,458	1,368	883	,1886	4,106	1,633	2,372	2,196	2,652	24,643
Oranges	4,555	2,168	847	986	738	887	1,008	1,343	307	2,358	288	2,220	17,705
Parsnips	12	25	16	16	26	24	16	20	2	10	2	20	189
Peas	.....	.....	.....	.....	11	9	.....	.....	.....	.....	10	.....	30
Peaches	.....	.....	.....	.....	.....	143	200	31	.....	22	3	.....	399
Rhubarb	2	3	7	6	13	10	1	.....	.....	5	.....	18	65
Pears	90	20	30	.....	.....	.....	61	68	53	768	198	50	1,338
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	.....	.....	84
Plants	37	199	19	49	40	22	12	159	3	8	19	11	578
Plums	.....	.....	.....	.....	.....	10	175	140	2	.....	.....	.....	327
Prunes	.....	.....	.....	.....	.....	3	16	.....	.....	.....	.....	.....	19
Seeds	24	74	60	83	47	36	51	33	31	50	15	45	549
Sprouts	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	8
Potatoes	6,727	9,286	7,691	11,636	4,752	5,757	5,803	9,040	4,140	6,033	10,263	8,440	89,568
Squash	3	4	1	2	4	5	.....	.....	.....	10	32	16	75
Quinces	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Tangerines	576	632	683	150	.....	.....	.....	.....	.....	.....	12	,055	3,108
Tomatoes	7	.....	35	60	.....	.....	.....	.....	.....	.....	.....	.....	102
Turnips	26	78	66	68	67	78	54	44	3	26	23	43	576
Trees	2	4	2	.....	.....	.....	.....	.....	.....	.....	.....	167	175
Vegetables	9	.....	7	1	.....	2	.....	.....	.....	1	.....	1	21
Bulbs	1	4	.....	17	12	1	2	.....	2	.....	.....	12	52
Total	16,421	16,982	14,497	18,460	8,867	9,785	10,673	18,673	8,202	22,282	30,419	24,557	199,818

APPENDIX NO. 6.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1917

(FOREIGN)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	23	6	17	8	22	7	2	5	2	5	6	7	110
Asparagus	5	3	2	5	13	2	2	.....	.....	.....	2	4	38
Beans	53	.....	600	.....	.....	40	.....	42	275	30	24	110	1,174
Bamboo Shoots	.....	.....	.....	1	11	1	.....	.....	.....	.....	2	.....	15
Caladiums	89	.....	3	.....	.....	.....	.....	.....	.....	.....	1	.....	93
Chestnuts Gr.	40	15	10	8	6	.....	10	.....	.....	.....	365	1	455
Chestnuts, Water	87	22	30	34	41	7	12	21	29	7	40	40	370
Cocoanuts	.....	.....	.....	.....	6	.....	.....	150	.....	25	.....	218	399
Fruit	1	12	1	5	2	.....	2	1	4	1	8	2	39
Garlic	21	4	8	28	107	13	4	9	10	3	15	6	228
Grape Fruit	4	.....	2	3	12	5	.....	8	1	1	1	.....	37
Gingers	29	17	11	15	37	1	10	16	3	5	15	17	176
Horse Radish	5	3	2	3	9	2	1	1	1	3	3	3	36
Lemons	5	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Yams	71	30	14	19	49	13	20	20	37	5	58	37	373
Nuts	5	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	7
Onions	2	703	1,693	4,516	359	1	403	28	2	.....	9	3	7,714
Oranges	27	14	28	11	27	9	10	11	5	3	13	12	165
Olives	1	.....	.....	.....	.....	2	.....	.....	2	.....	.....	.....	5
Pomelos	5	.....	7	1	2	1	.....	.....	.....	.....	.....	2	18
Pomegranates	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	2
Peanuts	282	84	50	.....	275	26	4	100	548	.....	.....	.....	1,319
Plants	9	4	797	40	86	214	4	187	15	.....	16	21	1,393
Sand-pears	10	4	6	2	5	.....	4	.....	2	.....	4	2	39
Quinces	.....	.....	143	.....	.....	.....	.....	.....	.....	.....	.....	.....	143
Seeds	47	92	.....	71	112	16	68	60	65	112	168	104	915
Corn	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	5
Potatoes	37	3	20	12	1,492	.....	1	31	1	.....	1	1	1,599
Wheat	.....	.....	.....	.....	.....	1,500	.....	.....	.....	.....	.....	.....	1,500
Sweet Potatoes	19	4	1	3	17	6	1	3	.....	3	7	3	72
Tangerines	20	1	18	16	9	.....	1	.....	.....	.....	7	11	83
White Nuts	6	5	.....	.....	3	.....	.....	.....	9	.....	12	1	36
Taro	2	1	.....	2	.....	.....	1	.....	.....	1	5	.....	14
Trees	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	2
Vegetables	1	1	9	.....	.....	1	1	1	12	2	15	10	53
Bulbs	58	2	.....	.....	.....	1	2	2	1	.....	17	9	96
Pears	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Total	964	981	3,469	4,809	2,709	562	691	1,024	207	815	626	1,868	— 18,725

APPENDIX NO. 7.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1918
(FOREIGN)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	4	7	5	1	5	3	.....	.....	7	1	1	5	39
Asparagus	6	5	.....	1	4	2	2	.....	.....	.....	.....	.....	20
Bamboo Shoots	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	3
Beans	.....	248	10	115	101	100	40	30	101	294	68	.....	1,107
Chestnuts, Water	47	28	9	65	10	15	12	4	.....	21	36	51	298
Caladiums	.....	42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	42
Carrots	.....	.....	.....	.....	.....	.....	32	26	.....	.....	.....	.....	58
Chestnuts, Gr.	.....	.....	.....	.....	.....	.....	.....	.....	51	.....	.....	.....	51
Cocoanuts	.....	.....	.....	.....	.....	4	.....	8	.....	.....	.....	.....	12
Corn	.....	.....	1	.....	.....	.....	2	.....	.....	.....	.....	.....	3
Fruit	2	3	1	.....	.....	2	.....	.....	5	.....	1	.....	14
Garlic	9	2	4	8	4	7	21	17	7	3	1	11	94
Grape Fruit	.....	1	1	1	4	3	5	3	2	.....	.....	.....	20
Horse Radish	6	4	1	2	2	1	1	.....	2	.....	1	.....	20
Lemons	.....	1	.....	1	.....	1	.....	.....	.....	.....	1	2	6
Limes	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
Gingers	34	2	11	21	4	7	20	20	53	8	9	23	212
Nuts	4	1	6	.....	2	2	5	.....	1	5	.....	4	30
Onions	2	4	137	2	10	1	4	4	2	5	.....	.....	171
Oranges	10	10	9	3	8	7	4	5	4	.....	3	4	67
Peas	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	496	366	865
Parsnips	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Wheat	.....	.....	.....	.....	411	.....	.....	.....	700	302	.....	.....	1,413
Peanuts	114	50	136	20	.....	175	103	146	166	30	.....	.....	940
Pears	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Plants	15	4	47	54	23	4	99	.....	201	1	880	68	1,396
White Nuts	8	7	.....	.....	.....	.....	.....	.....	.....	1	4	.....	20
Pomelo	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	4	2	7
Seeds	100	119	110	51	29	49	140	57	142	35	154	20	1,006
Sand Pears	2	5	1	1	3	2	4	5	3	1	.....	.....	27
Potatoes	1	40	.....	2	1	.....	.....	3	1	.....	.....	.....	48
Sweet Potatoes	5	6	6	8	.....	1	9	2	4	.....	4	.....	45
Tangerines	12	7	11	2	.....	.....	.....	.....	.....	.....	4	4	40
Taro	1	.....	1	.....	.....	.....	.....	.....	.....	.....	2	.....	4
Yams	59	18	4	42	15	.....	29	25	37	3	26	34	292
Vegetables	2	6	.....	1	8	.....	.....	1	.....	3	.....	.....	21
Trees	.....	.....	.....	.....	.....	13	.....	.....	.....	.....	.....	.....	13
Bulbs	8	2	.....	1	1	.....	.....	.....	.....	.....	11	7	30
Total	451	623	511	406	647	400	583	356	1,489	718	1,708	602	8,489

APPENDIX NO. 8.

FRUITS AND VEGETABLES RECEIVED IN HILO DURING 1917.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	873	375	765	161	776	42	291	392	472	803	1,029	1,158	7,132
Apricots	.....	.....	.....	.....	.....	181	46	.....	.....	.....	.....	.....	227
Artichokes	.....	1	1	5	.....	1	.....	.....	1	2	2	1	13
Beans	62	47	24	19	.....	.....	.....	25	.....	20	18	10	225
Cabbage	.....	.....	.....	.....	.....	1	1	1	1	.....	.....	1	5
Asparagus	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	2
Cauliflower	27	21	23	18	24	26	25	8	9	7	15	4	207
Celery	14	9	4	.....	4	.....	12	5	8	9	9	6	80
Cherries	.....	.....	.....	.....	108	117	104	.....	.....	.....	.....	.....	329
Cranberries	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	2
Fruit	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
Garlic	12	12	31	20	5	8	19	24	37	14	15	5	202
Grape Fruit	22	13	31	15	14	11	8	8	12	8	16	15	173
Grapes	32	5	.....	.....	.....	.....	36	57	74	119	74	32	429
Horse Radish	.....	.....	1	2	.....	.....	.....	.....	.....	1	1	1	6
Lemons	37	7	40	25	37	45	31	29	45	41	28	33	398
Megs	3	.....	.....	.....	.....	33	50	28	38	35	7	7	191
Nectarines	.....	.....	.....	.....	.....	15	18	.....	.....	.....	.....	.....	33
Nuts	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	8	12	25
Onions	240	346	132	99	37	25	242	367	353	683	348	387	3,259
Oranges	818	453	912	500	227	819	549	347	398	111	518	1,068	6,715
Parsnips	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2
Peaches	.....	.....	.....	.....	.....	218	117	55	67	10	.....	.....	467
Rhubarb	.....	.....	.....	.....	4	3	4	.....	.....	.....	.....	1	12
Pears	.....	.....	.....	.....	.....	4	60	45	41	30	15	15	210
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	88	5	98
Plants	9	6	15	6	13	3	.....	4	3	.....	1	.....	60
Plums	.....	.....	.....	.....	.....	149	157	45	45	16	.....	.....	412
Pomegranates	.....	.....	.....	.....	.....	.....	.....	.....	3	38	38	.....	79
Quinces	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Seeds	10	4	8	4	9	1	.....	12	.....	4	.....	.....	52
Potatoes	916	761	1,406	460	905	318	384	592	843	1,328	802	825	9,535
Squash	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Tangerines	214	135	112	40	25	.....	6	.....	.....	.....	.....	175	707
Tomatoes	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Turnips	.....	3	8	5	2	2	3	.....	.....	2	3	2	29
Vegetables	4	5	9	7	6	4	4	1	1	3	3	8	55
Total	3,293	2,202	3,522	1,391	2,196	2,013	2,167	2,063	2,442	3,286	3,040	3,762	31,377

APPENDIX NO. 9.

FRUITS AND VEGETABLES RECEIVED IN HILO DURING 1918.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	429	276	106	385	379	21	33	640	415	1,142	984	1,158	5,968
Apricots	.....	.....	.....	.....	.....	6	16	.....	.....	.....	.....	.....	22
Artichokes	1	1	2	1	2	3	1	1	.....	2	.....	1	15
Beans	29	.....	.....	55	30	164	42	11	58	67	63	10	524
Cabbage	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	3
Asparagus	.....	1	1	2	2	10	.....	.....	.....	.....	.....	1	17
Cauliflower	6	.....	2	6	4	4	5	11	5	9	.....	4	56
Celery	3	6	3	4	.....	1	4	9	4	28	.....	6	68
Cherries	.....	.....	.....	.....	.....	20	6	.....	.....	.....	.....	.....	26
Garlic	8	5	4	14	5	4	20	22	16	9	3	5	115
Grape Fruit	7	9	11	9	9	13	11	12	11	16	2	15	125
Grapes	.....	.....	.....	.....	.....	.....	20	12	82	79	89	32	314
Horse Radish	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Lemons	16	7	5	16	9	28	19	24	25	6	6	33	194
Megs	.....	.....	.....	.....	.....	2	18	30	.....	8	.....	7	65
Nectarines	.....	.....	.....	.....	.....	.....	.....	7	.....	.....	.....	.....	7
Nuts	.....	.....	.....	.....	.....	2	.....	5	1	.....	8	12	28
Onions	307	169	143	319	361	380	527	443	608	251	311	387	4,206
Oranges	558	281	284	270	189	287	305	238	90	43	24	1,063	3,632
Peas	.....	1	2	4	2	6	1	10	2	.....	.....	.....	28
Peaches	.....	.....	.....	.....	.....	3	8	58	68	44	.....	.....	181
Rhubarb	.....	1	2	2	1	.....	1	.....	.....	.....	.....	1	8
Pears	5	.....	.....	.....	.....	.....	16	14	16	18	8	15	92
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	.....	5	35
Plants	1	1	4	.....	2	1	1	.....	.....	8	.....	.....	18
Plums	.....	.....	.....	.....	.....	.....	26	63	16	3	.....	.....	108
Pomegranates	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	41	.....	61
Seeds	.....	.....	.....	12	13	5	5	4	.....	2	.....	.....	41
Potatoes	1,155	832	817	972	885	1,502	1,228	728	381	630	1,305	825	11,255
Tangerines	25	30	24	19	.....	.....	.....	.....	.....	.....	15	175	288
Tomatoes	.....	.....	.....	.....	1	2	.....	3	.....	.....	.....	.....	6
Turnips	3	2	4	.....	1	3	2	2	2	2	2	2	28
Vegetables	1	1	2	2	1	3	1	2	.....	1	.....	8	22
Total	2,554	1,623	1,416	2,092	1,896	2,470	2,316	2,344	1,795	2,415	2,861	3,762	27,644

APPENDIX NO. 10.

FRUITS AND VEGETABLES RECEIVED IN KAHULUI DURING 1917.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	127	139	124	101	74	1	45	85	165	195	274	309	1,639
Apricots	.....	.....	.....	.....	.....	16	8	.....	.....	.....	.....	.....	24
Artichokes	2	1	2	2	2	3	1	.....	.....	.....	.....	1	14
Beans	.....	.....	.....	.....	1	2	.....	1	.....	.....	.....	.....	4
Cauliflower	12	11	11	12	8	13	6	3	5	7	5	.....	93
Celery	13	1	1	5	4	9	6	6	11	13	8	.....	77
Celery Root	2	1	.....	1	.....	.....	.....	1	.....	.....	.....	.....	5
Cherries	.....	.....	.....	.....	7	50	34	6	.....	.....	.....	.....	97
Cranberries	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Fruit	.....	.....	.....	.....	.....	10	11	1	.....	.....	.....	.....	22
Asparagus	2	2	.....	2	1	1	.....	.....	.....	.....	.....	.....	8
Garlic	4	2	3	3	2	10	1	2	7	3	3	.....	40
Grape Fruit	4	5	6	7	4	10	6	3	9	3	2	7	66
Grapes	.....	.....	.....	.....	.....	.....	6	5	24	38	46	2	121
Lemons	3	7	15	7	7	15	10	2	9	10	10	12	107
Megs	.....	.....	.....	.....	.....	7	16	10	8	14	2	.....	57
Onions	115	45	8	27	4	.....	20	20	77	47	93	63	519
Oranges	127	129	114	117	251	357	212	97	98	130	107	150	1,889
Parsnips	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Peas	.....	.....	.....	4	3	1	.....	1	.....	.....	.....	.....	9
Peaches	.....	.....	.....	3	.....	13	35	13	40	18	.....	.....	122
Rhubarb	1	4	2	3	3	5	3	.....	2	3	.....	.....	26
Pears	24	12	1	1	.....	.....	10	15	36	34	31	.....	164
Persimmons	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	4
Plants	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
Plums	.....	.....	.....	.....	.....	16	31	10	26	16	.....	.....	99
Prunes	.....	.....	.....	.....	.....	10	.....	4	.....	.....	.....	.....	14
Sprouts	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
Potatoes	135	141	13	75	45	69	24	32	259	175	110	198	1,276
Squash	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
Tangerines	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	20
Turnips	3	3	4	2	3	6	8	2	1	3	.....	.....	35
Trees	.....	2	.....	.....	.....	.....	.....	.....	5	.....	2	.....	9
Vegetables	4	2	1	1	2	3	.....	1	1	.....	.....	.....	15
Total	581	511	505	378	421	629	498	321	782	710	699	762	6,587

APPENDIX NO. 11.

FRUITS AND VEGETABLES RECEIVED IN KAHULUI DURING 1918.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	301	147	90	60	145	.....	5	50	55	135	195	143	1,326
Apricots	.....	.....	14	.....	.....	5	4	.....	.....	.....	.....	.....	23
Cauliflower	3	1	1	.....	2	3	1	.....	.....	.....	.....	.....	11
Celery	2	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	5
Cherries	.....	.....	.....	.....	20	12	18	.....	.....	.....	.....	.....	50
Rhubarb	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Garlic	3	.....	.....	.....	10	8	8	.....	.....	.....	.....	.....	29
Grape Fruit	2	5	3	4	9	5	8	5	2	4	6	5	58
Grapes	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Lemons	6	4	2	2	8	5	8	5	1	4	10	5	60
Megs	.....	.....	.....	.....	.....	5	4	.....	.....	.....	.....	.....	9
Onions	169	93	53	14	85	84	89	8	.....	95	153	33	876
Oranges	185	107	89	52	132	101	41	68	.....	11	5	33	824
Peas	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Peaches	.....	.....	.....	.....	.....	3	20	.....	.....	.....	13	.....	36
Pears	4	.....	.....	.....	.....	.....	1	.....	.....	14	8	.....	27
Plants	.....	4	1	.....	1	.....	.....	.....	.....	.....	.....	.....	6
Plums	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	10
Potatoes	327	89	69	52	261	476	126	8	.....	32	130	95	1,665
Tangerines	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	5
Total	1,007	451	324	185	673	707	344	144	58	295	520	319	5,027

APPENDIX NO 12.
INTER-ISLAND INSPECTION
1917

Month	Vessels Inspected	PASSED				REJECTED			Total Inspected
		Fruit	Plants	Vegetables	Total	Fruit	Plants	Total	
January	71	16	137	805	958	4	16	20	978
February	63	8	111	733	852	5	4	9	861
March	58	8	189	760	957	9	8	17	974
April	61	17	190	614	821	3	5	8	829
May	62	11	130	641	832	4	6	10	842
June	58	17	184	827	1,028	5	6	11	1,039
July	64	26	103	695	824	3	4	7	831
August	59	20	242	714	976	3	3	6	982
September	58	20	108	711	839	2	4	6	845
October	60	23	207	886	1,116	3	7	10	1,126
November	57	18	218	868	1,104	11	7	18	1,122
December	54	11	119	924	1,054	8	4	12	1,066
Total	725	190	1,938	10,183	11,361	60	74	134	11,495

INTER-ISLAND INSPECTION
1918

Month	Vessels Inspected	PASSED				REJECTED				Inspected Total
		Fruit	Plants	Veg's.	Total	Fruit	Plants	Total	Cane Sugar	
January	58	14	164	752	930	2	....	2	....	932
February	52	22	65	861	948	....	2	2	....	950
March	52	13	141	969	1,123	8	3	11	....	1,134
April	52	13	177	1,062	1,252	....	2	2	....	1,254
May	61	16	184	979	1,179	4	3	7	....	1,186
June	58	19	162	951	1,132	3	3	6	....	1,138
July	57	63	85	854	1,102	1	6	7	....	1,009
August	47	841	78	817	1,231	2	3	5	100*	1,336
September	58	12	106	868	986	7	5	12	....	998
October	61	162	62	870	1,094	2	3	5	....	1,099
November	58	32	101	931	1,064	4	9	13	....	1,077
December	57	144	97	509	750	4	20	24	....	774
Total	671	851	1,417	10,423	12,691	37	59	96	100	12,887

*Rejected

APPENDIX NO. 13.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE I. DIVISION OF PLANT INSPECTION.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule I of the Board concerning the importation or introduction into the Territory of Hawaii of fresh fruit from East or West Indies, Asia, Australia, Ocanica, Malaysia, Mexico, Central and South America, approved by the Governor of Hawaii on October 25, 1904, so as to read as follows and to be known as Rule I—Division of Plant Inspection:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of fruit flies and insects, their eggs, larvae or pupae, and all diseases of plants, fruits or other vegetation of value, all persons, companies and corporations are hereby prohibited from introducing, importing or bringing in baggage or otherwise into the Territory of Hawaii, or into any of its ports for the purpose of debarkation into the said Territory, any fresh fruit from East or West Indies, Asia, Australasia, Oceanica, Malaysia, Mexico, Central and South America.

Section 2. All plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains or cereals may be imported into the Territory of Hawaii from any foreign country; provided, however, that permission has been granted by the Federal Horticultural Board of Washington, D.C., and that such permit has been received by the Chief Plant Inspector of the Territory. All plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains or cereals, including those from the mainland of the United States, are subject to inspection upon arrival into the Territory of Hawaii. All persons and corporations are hereby prohibited from removing or taking any of the above articles from a wharf or landing place without first having notified the Division of Plant Inspection of the arrival of said article or articles and having received permission from the duly authorized officer to remove or take the same.

Section 3. All fruits, vegetables, plants, parts of plants, bulbs, roots or tubers, seeds, grains or cereals from the United States of America and the Dominion of Canada that are not prohibited under rules and regulations of the Federal Horticultural Board of Washington, D.C., may be introduced, imported or brought into the Territory of Hawaii either by freight, express or as packages of passengers, provided, however, that all such fruits, vegetables, plants, parts of plants, bulbs, roots, seeds, grains and cereals are free from pests and diseases. All persons importing, introducing or bringing into the Territory of Hawaii any fruits, vegetables, plants, or parts of plants, bulbs, roots or tubers, seeds, grains and cereals must present the same to or notify the Chief Plant Inspector of the Board of Agriculture and Forestry before landing any of these articles.

Section 4. If any fresh fruits vegetables, plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains, or cereals shall be imported, introduced or brought in baggage or otherwise, into the Territory of Hawai, or into any of its ports for the purpose of debarkation into said Territory, contrary to law or this regulation, the same shall, in the discretion of the Board of Commissioners of Agriculture and Forestry or its duly authorized agent, officer or inspector, be immediately seized and destroyed or deported at the expense of the importer or intro-

ducer, and the person or persons or corporation introducing or importing the same shall be guilty of a misdemeanor and shall be liable to the penalty or penalties provided by law.

Section 5. This rule, as amended, shall take effect upon its approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, T.H. Governor of Hawaii.

APPENDIX NO. 14.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE III. DIVISION OF PLANT INSPECTION.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule III of the Board concerning the importation of rice, approved by the Governor of Hawaii on September 7, 1906, so as to read as follows and to be known as Rule III—Division of Plant Inspection:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of insects, their eggs, larvae or pupae, and fungus diseases, injurious or liable to become injurious to rice either growing or stored, all persons, companies and corporations are hereby prohibited from introducing or importing into the Territory of Hawaii or into any of its ports, any rice infested with such insects.

Section 2. For the purpose of preventing all rice shipments from Japan for entry into the Territory of Hawaii from being infested with insects, their eggs, larvae or pupae, or fungus diseases, injurious or liable to become injurious to rice, all shippers are required to have their shipment fumigated at the port of debarkation in Japan under government supervision and before placing same on board the vessel, and all shipments must be accompanied with a certificate of fumigation signed by the proper authorized person.

Section 3. If any rice infested with insects, their eggs, larvae or pupae, injurious to rice, growing or stored, shall be imported or introduced into the Territory of Hawaii or into any of its ports, the same shall, in the discretion of the Board of Commissioners of Agriculture and Forestry, or its duly authorized agent, officer or inspector be immediately destroyed or deported at the expense of the importer or introducer, and the person or persons or corporation introducing or importing the same shall be guilty of a misdemeanor and shall be liable to the penalty or penalties provided by law.

Section 4. This rule, as amended, shall take effect upon its approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, T.H. Governor of Hawaii.

APPENDIX NO. 15.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XIX. DIVISION OF PLANT INSPECTION.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the Introduction of Pineapple Plants, Suckers, Sprouts, or Fruit.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following Rule and Regulation:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of serious pests and diseases of the pineapple plant, all persons, companies and corporations are hereby prohibited from introducing or importing or receiving as freight and express matter or from bringing or receiving in baggage or otherwise into the Territory of Hawaii or into any of its ports for the purpose of debarkation into said Territory any pineapple plant, sucker or sprout or fruit from the West Indies, Central America, including the Panama Canal Zone, or any other locality where said serious pests and diseases exist or may become known to exist.

Section 2. Any person or persons or corporation violating the above rule shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not to exceed Five Hundred ($500.00) Dollars, as provided by Section 529, Revised Laws of Hawaii of 1915.

Section 3. This rule shall take effect upon its approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, T.H. Governor of Hawaii.

Division of Animal Industry

LETTER OF SUBMITTAL

Honolulu, Hawaii,
December 31, 1918.

The Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I beg to submit herewith a report on the work of the Division of Animal Industry for the biennial period ending December 31, 1918.

The first chapter, under the heading "Introduction," contains a concise resume of the whole and has been written with a view to furnishing the main facts to the legislators and others who may have many reports to acquaint themselves with in a short time. The reports of the deputy territorial veterinarians, with the exception of the one from Dr. Elliot of East Hawaii, have not been given in detail as they pertained principally to the anthrax outbreaks and are referred to under that heading. The assistant territorial veterinarian, Dr. L. N. Case, has written the chapter on Bovine Tuberculosis Control.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

Report of the Territorial Veterinarian

INTRODUCTION

The work of the Division of Animal Industry has during the past two years differed from that of the preceding decade in that it had to be devoted to combatting a disease hitherto unknown in the Territory, and which for a while threatened the entire local live stock industry, namely *Anthrax*. For the first time in the twelve years of its existence this Division had to deal with a real epidemic of a virulent malignant disease, fatal to man and beast and the introduction of which remains a mystery to this day. The total absence of a natural source of infection and the inexplicable manner in which it jumped from Kauai to Oahu and Maui leaves, however, little doubt that the propelling force behind it was of Hun origin.

That the Legislature was in session at the time and promptly provided liberal means wherewith to fight the outbreak accounts in no small way for the effectiveness with which the onslaught was met. On both Kauai and Oahu the disease was kept confined—by stringent quarantine measures—to the premises where it first made its appearance, and there is little reason to doubt that the seven outbreaks on Maui, though widely scattered, were planted simultaneously or at least within a couple of days, and were independent of each other.

It is of course to be regretted that the actual perpetrators of this outrage were not brought to justice, at least in so far as this specific crime is concerned, but there is reason to believe that the dragnet applied to local alien enemies caught at least one of them.

In any case, with a loss of less than five hundred head of cattle and horse stock the epidemic was brought to a complete standstill on Oahu and Maui before the fall of 1917, while only two cases have occurred on Kauai during 1918, and the last one of these more than seven months ago.

This does not mean that the infection is eradicated, but is due to the vaccination of all animals in infected pastures. Under favorable conditions the infection may remain active or alive in the soil for years, if not permanently, and preventive measures (vaccination) and constant vigilance must be continued for an indefinite period. A single anthrax carcass left unburned is suf-

ficient to cause a destructive outbreak. The coming Legislature will therefore be asked to provide for the continuation of these preventive measures.

Another divergence from previous years' methods has been the bovine tuberculosis control work, under the indemnification act passed by the last Legislature. This act appropriated $20,000.00 for the indemnification of owners of tuberculous cattle destroyed for the purpose of eradicating this disease from the Territory.

While this Division has persisted in suppressing bovine tuberculosis as an infectious and contagious disease transmissible to man, and especially to children, ever since 1910, it was not until the passage of the above mentioned act, with its very liberal compensation provisions, that the opposition of the dairy owners can be said to have subsided and the prospects of complete eradication to have come within reach. That this policy was sound has been borne out by subsequent legislative action on the part of most of the states in the Union and is now finally corroborated by the federal government volunteering to share the losses resulting from tuberculosis eradication work.

The 1919 agricultural appropriation bill just passed by Congress provides for the payment by the federal department of agriculture of one-third of the difference between the appraised value of the condemned cattle and the salvage value of the carcass, provided that the State, county or municipality where the cattle are kept or owned is cooperating with the tuberculosis work and pays at least an equal amount to the owner. In other words, when this bill becomes effective here, the Territory will save about one-third of the compensation now being paid, but what is far more important is that the highest authority has endorsed the policy which the Board of Agriculture and Forestry had adopted before any other state or territory in the Union had attempted it in any way but tentatively. At the present writing the bill, as passed, omits the word "Territory", mentioning only States, counties and municipalities, which, according to advice received from Washington, bars this Territory from participating in the appropriation ($500,000.00). The next Congress, however, meeting March 4th, 1919, will undoubtedly continue this policy of partial indemnification by the federal government, when it is expected that this unfortunate omission of the Territory will be corrected.

That we are entitled to participate in this benevolent appropriation is assured in a letter from the Chief of the Bureau of Animal Industry, a paragraph of which reads:

"Hawaii not being a State we could not indemnify owners in cooperation with the Territory, but it seems as if we might pay indemnities in cooperation with the various counties of Hawaii provided cooperative arrangements could be made with those units of government."

There being no county appropriations nor county organizations to handle the tuberculosis control work, a complete reorganization of all live stock sanitary matters, including the expenditure of territorial appropriations by county officials, would have to be effected in order to make the Territory benefit by the federal act. Such an arrangement, if it were at all possible, could be effected only by legislative action and would be required only for the remaining couple of months of the fiscal year ending June 30, 1919. In the meantime, the territorial delegate to Congress will take the matter up in Washington and will undoubtedly succeed in having the said act either amended or corrected.

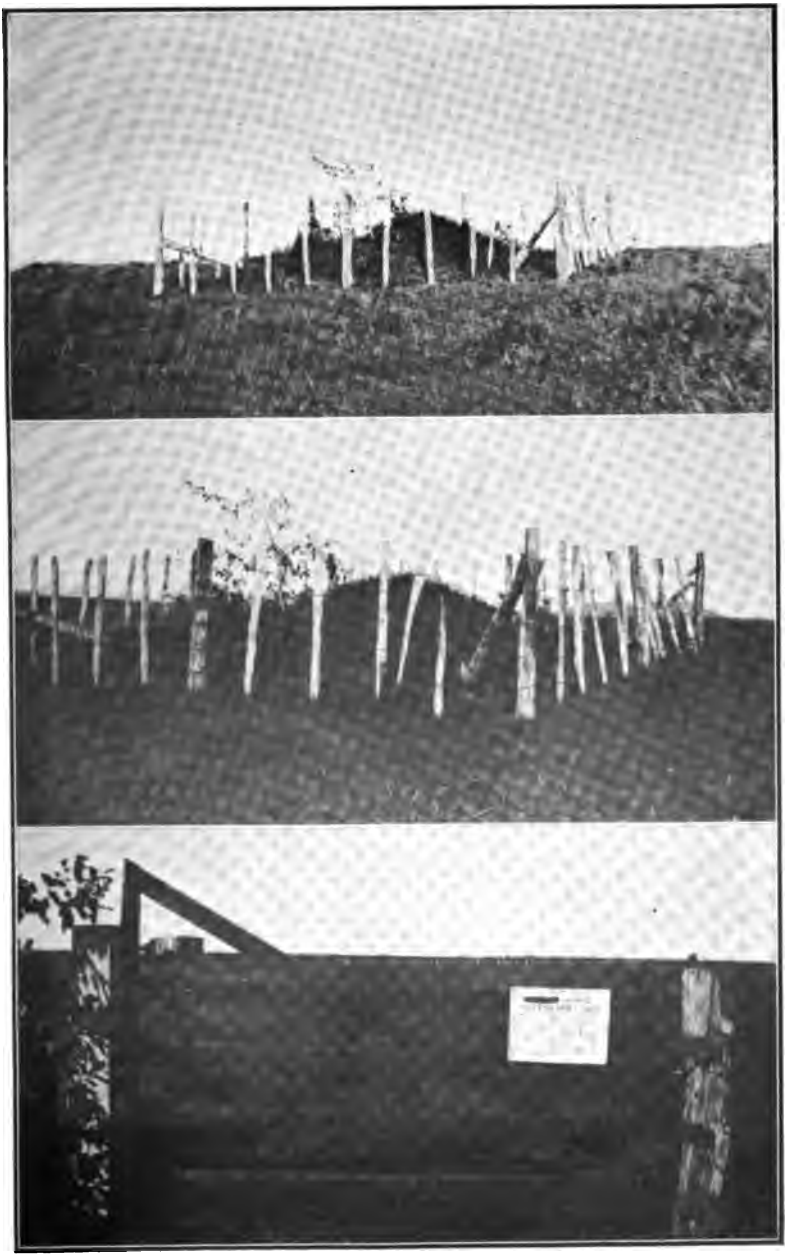
Under authority of Act 121 of the Session Laws of 1917, this Division has tested 9,577 head of cattle, of which number 453 were found to be affected with tuberculosis. The condemned cattle were appraised at an aggregate of $40,265.00, or an average of $98.93 per head. After slaughter and inspection the wholesome parts of the carcasses were sold for $17,674.66, or an average of $44.52 per head. The owners consequently received a total of $83.76 per head, or more than eighty per cent of the appraised value, as by law provided for.

It will therefore be seen that there remained about $4,000.00 unexpended at the end of the calendar year 1918.

Altogether this law has given general satisfaction and when it is considered that all of the condemned animals were diseased and a menace to the healthy animals in the herds from which they were removed, and further, that a majority of them were unprofitable as milk producers and either were or might become at any time dangerous to human beings, then it cannot be disputed that the Territory has paid liberally for the privilege of destroying these centers of infection.

In fact, a comparison with the amount of indemnification allowed by most of the states which have not inaugurated tuberculosis eradication campaigns, a total of forty on December 1st, 1918, shows the amounts allowed by this Territory are far above the average. On the other hand, it must be conceded that dairy cattle are more valuable here than anywhere else in the Union, and that it costs a great deal more to maintain them here and to produce milk. No other state or community allows an indemnity of $150.00 per head, plus the value of the carcass, except for purebred registered animals. But even so, the fact remains that the dairy industry has had a severe setback through the excessive war prices of all feeds. Only the thrifty oriental, who produces and delivers his milk through unceasing work on the part of himself, his family and relatives, seems satisfied with the small margin of profit which a bunch of low grade cows, fed principally

Plate 9.



Mounded, Fenced-in, and Tree-planted Graves of Anthrax Carcasses on Kauai. Many of them contain eight carcasses. Lower shows quarantine signs placed on all pasture gates in infected district.

APPENDIX NO 12.
INTER-ISLAND INSPECTION
1917

Month	Vessels Inspected	PASSED				REJECTED			Total Inspected
		Fruit	Plants	Vegetables	Total	Fruit	Plants	Total	
January	71	16	137	805	958	4	16	20	978
February	63	3	111	738	852	5	4	9	861
March	58	8	189	760	957	9	8	17	974
April	61	17	190	614	821	3	5	8	829
May	62	11	130	641	832	4	6	10	842
June	58	17	184	827	1,028	5	6	11	1,039
July	64	26	103	695	824	3	4	7	831
August	59	20	242	714	976	3	3	6	982
September	58	20	108	711	839	2	4	6	845
October	60	23	207	886	1,116	3	7	10	1,126
November	57	18	218	868	1,104	11	7	18	1,122
December	54	11	119	924	1,054	8	4	12	1,066
Total	725	190	1,938	10,183	11,361	60	74	134	11,495

INTER-ISLAND INSPECTION
1918

Month	Vessels Inspected	PASSED				REJECTED				Inspected Total
		Fruit	Plants	Veg's.	Total	Fruit	Plants	Total	Cane Sugar	
January	58	14	164	752	930	2	....	2	....	932
February	52	22	65	861	948	....	2	2	....	950
March	52	13	141	969	1,123	8	3	11	....	1,134
April	52	13	177	1,062	1,252	....	2	2	....	1,254
May	61	16	184	979	1,179	4	3	7	....	1,186
June	58	19	162	951	1,132	3	3	6	....	1,138
July	57	63	85	854	1,102	1	6	7	....	1,009
August	47	341	73	817	1,231	2	3	5	100*	1,336
September	58	12	106	868	986	7	5	12	....	998
October	61	162	62	870	1,094	2	3	5	....	1,099
November	58	32	101	931	1,064	4	9	13	....	1,077
December	57	144	97	509	750	4	20	24	....	774
Total	671	851	1,417	10,423	12,691	37	59	96	100	12,887

*Rejected

APPENDIX NO. 13.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE I. DIVISION OF PLANT INSPECTION.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule I of the Board concerning the importation or introduction into the Territory of Hawaii of fresh fruit from East or West Indies, Asia, Australia, Ocanica, Malaysia, Mexico, Central and South America, approved by the Governor of Hawaii on October 25, 1904, so as to read as follows and to be known as Rule I—Division of Plant Inspection:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of fruit flies and insects, their eggs, larvae or pupae, and all diseases of plants, fruits or other vegetation of value, all persons, companies and corporations are hereby prohibited from introducing, importing or bringing in baggage or otherwise into the Territory of Hawaii, or into any of its ports for the purpose of debarkation into the said Territory, any fresh fruit from East or West Indies, Asia, Australasia, Oceanica, Malaysia, Mexico, Central and South America.

Section 2. All plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains or cereals may be imported into the Territory of Hawaii from any foreign country; provided, however, that permission has been granted by the Federal Horticultural Board of Washington, D.C., and that such permit has been received by the Chief Plant Inspector of the Territory. All plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains or cereals, including those from the mainland of the United States, are subject to inspection upon arrival into the Territory of Hawaii. All persons and corporations are hereby prohibited from removing or taking any of the above articles from a wharf or landing place without first having notified the Division of Plant Inspection of the arrival of said article or articles and having received permission from the duly authorized officer to remove or take the same.

Section 3. All fruits, vegetables, plants, parts of plants, bulbs, roots or tubers, seeds, grains or cereals from the United States of America and the Dominion of Canada that are not prohibited under rules and regulations of the Federal Horticultural Board of Washington, D.C., may be introduced, imported or brought into the Territory of Hawaii either by freight, express or as packages of passengers, provided, however, that all such fruits, vegetables, plants, parts of plants, bulbs, roots, seeds, grains and cereals are free from pests and diseases. All persons importing, introducing or bringing into the Territory of Hawaii any fruits, vegetables, plants, or parts of plants, bulbs, roots or tubers, seeds, grains and cereals must present the same to or notify the Chief Plant Inspector of the Board of Agriculture and Forestry before landing any of these articles.

Section 4. If any fresh fruits vegetables, plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains, or cereals shall be imported, introduced or brought in baggage or otherwise, into the Territory of Hawai, or into any of its ports for the purpose of debarkation into said Territory, contrary to law or this regulation, the same shall, in the discretion of the Board of Commissioners of Agriculture and Forestry or its duly authorized agent, officer or inspector, be immediately seized and destroyed or deported at the expense of the importer or intro-

ducer, and the person or persons or corporation introducing or importing the same shall be guilty of a misdemeanor and shall be liable to the penalty or penalties provided by law.

Section 5. This rule, as amended, shall take effect upon its approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, T.H. Governor of Hawaii.

APPENDIX NO. 14.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE III. DIVISION OF PLANT INSPECTION.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule III of the Board concerning the importation of rice, approved by the Governor of Hawaii on September 7, 1906, so as to read as follows and to be known as Rule III—Division of Plant Inspection:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of insects, their eggs, larvae or pupae, and fungus diseases, injurious or liable to become injurious to rice either growing or stored, all persons, companies and corporations are hereby prohibited from introducing or importing into the Territory of Hawaii or into any of its ports, any rice infested with such insects.

Section 2. For the purpose of preventing all rice shipments from Japan for entry into the Territory of Hawaii from being infested with insects, their eggs, larvae or pupae, or fungus diseases, injurious or liable to become injurious to rice, all shippers are required to have their shipment fumigated at the port of debarkation in Japan under government supervision and before placing same on board the vessel, and all shipments must be accompanied with a certificate of fumigation signed by the proper authorized person.

Section 3. If any rice infested with insects, their eggs, larvae or pupae, injurious to rice, growing or stored, shall be imported or introduced into the Territory of Hawaii or into any of its ports, the same shall, in the discretion of the Board of Commissioners of Agriculture and Forestry, or its duly authorized agent, officer or inspector be immediately destroyed or deported at the expense of the importer or introducer, and the person or persons or corporation introducing or importing the same shall be guilty of a misdemeanor and shall be liable to the penalty or penalties provided by law.

Section 4. This rule, as amended, shall take effect upon its approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, T.H. Governor of Hawaii.

APPENDIX NO. 15.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XIX. DIVISION OF PLANT INSPECTION.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the Introduction of Pineapple Plants, Suckers, Sprouts, or Fruit.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following Rule and Regulation:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of serious pests and diseases of the pineapple plant, all persons, companies and corporations are hereby prohibited from introducing or importing or receiving as freight and express matter or from bringing or receiving in baggage or otherwise into the Territory of Hawaii or into any of its ports for the purpose of debarkation into said Territory any pineapple plant, sucker or sprout or fruit from the West Indies, Central America, including the Panama Canal Zone, or any other locality where said serious pests and diseases exist or may become known to exist.

Section 2. Any person or persons or corporation violating the above rule shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not to exceed Five Hundred ($500.00) Dollars, as provided by Section 529, Revised Laws of Hawaii of 1915.

Section 3. This rule shall take effect upon its approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, T.H. Governor of Hawaii.

Sec. 2. The owner or importer must present an affidavit to the effect that the said certificate refers to the swine in question, that the same have been shipped from the premises mentioned in said certificate in clean and disinfected cars, and without unloading and that they have not been submitted to the serum simultaneous or double treatment for hog cholera within thirty days prior to shipment

Sec. 3. Swine arriving in the Territory without such certificate and affidavit shall be subject to a quarantine of two weeks at the expense of the owner or importer.

RULE VIII.—DOGS.

Sec. 1 All dogs arriving in the Territory of Hawaii and coming from or through any country, state or territory, where rabies is known to exist, shall be kept in quarantine, on premises provided by this Board, for a period of 120 days, or for such longer period, not to exceed 180 days, counting from the date of embarkation as, in the judgment of the Territorial Veterinarian, shall be necessary.

Sec. 2. Dogs belonging to tourists or temporary visitors shall be taken to the quarantine station and held there until the departure of the tourist or visitor, when the dog will be delivered on board by the Territorial Veterinarian, all expenses to be paid by the owner, agent or keeper.

Sec. 3. It shall be the duty of the owner, master or agent of any vessel arriving in the Territory of Hawaii to immediately notify the Territorial Veterinarian of the presence on board of any dog, whether intended for disembarkation or not. Such dog must, in the discretion of the Territorial Veterinarian, be removed to the animal quarantine station or confined on board in such a manner as to insure that it does not come in contact with any other dogs or animals which might transmit the disease or rabies.

Dogs which belong to steamers or other vessels, their officers or crew, or other dogs on board such vessels destined for a further port, must be securely confined as directed by the Territorial Veterinarian as long as the steamer or vessel remains in port. No other dogs shall be allowed on board unless intended for exportation, in which case they shall remain on board when once brought there, and must be confined in the same manner as above described.

Sec. 4. Until further notice the port of Honolulu shall constitute the only port through which dogs may enter the Territory. Dogs arriving at any other port must be kept confined on board until arrival at Honolulu, or must depart with the vessel when it leaves the Territory.

Sec. 5. All expenses in connection with the quarantining of dogs entering the Territory must be borne by the owner, agent, keeper, or consignees, and no dog shall be released from quarantine until such costs are paid.

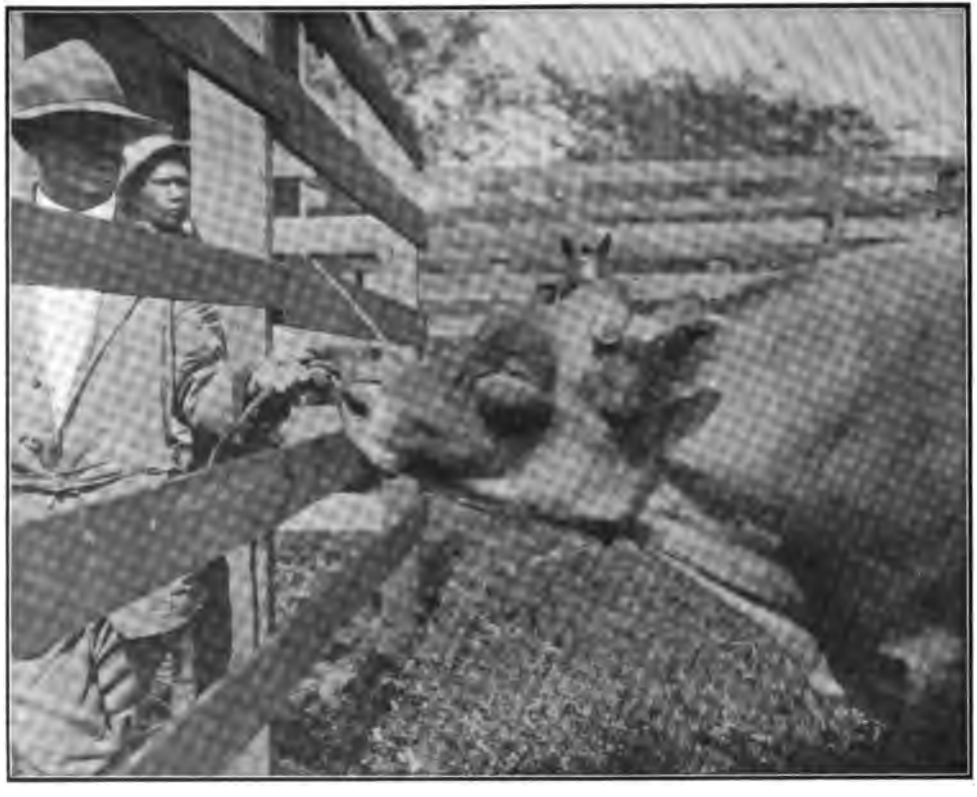
RULE IX.—POULTRY

All live poultry arriving in the Territory shall be held for inspection and be declared on the list of live stock furnished the inspecting officer on the arrival of any steamer or vessel in the Territory. The number of deaths or cases of sickness and causes thereof, while en route, shall also be noted. Until inspected and passed by the Territorial Veterinarian all such poultry must remain on board or be kept confined on the pier awaiting his arrival.

RULE X.—WILD ANIMALS, PETS, MENAGERY AND ZOOLOGICAL GARDEN ANIMALS.

The traffic in this class of animals in regulated by the United

Plate 10.



Purebred Jersey Bull Showing Large Reaction to the Intrapalpebral Tuberculin Test. The lesions found on autopsy were confined to a few small nodules in both retropharyngeal glands.

States Department of Agriculture, but the Territorial Veterinarian must be notified of the arrival of all such specimens as it is possible for them to carry diseases transmissible to domestic animals and man.

These rules shall take effect upon approval by the Governor.

Approved this 8th day of June, 1918.

LUCIUS E. PINKHAM,

Honolulu, Territory of Hawaii. Governor of Hawaii.

LAWS UPON WHICH THE FOREGOING REGULATIONS ARE BASED.

Extracts from Chapter 37, Revised Laws of Hawaii of 1915, as amended by Section 8 of Act 136 of the Session Laws of 1915.

"Sec. 503. RULES AND REGULATION. Said board of agriculture and forestry shall have power and authority to make rules and regulations, and to amend the same from time to time in its discretion, subject to the approval of the governor, for and concerning the inspection, quarantine, disinfection or destruction, either upon introduction into the Territory, or at any time or place within the Territory, of animals and the premises and effects used in connection with such animals. Included therein may be rules and regulations governing the transportation of animals between the different islands of the Territory and along the highways thereof, and also such rules and regulations as may be approved by the governor requiring the owners and masters of any boat or vessel engaged in inter-island transportation of live stock, and the managers and agents of railway companies crarying live stock within the Territory, to make reports of the number and class of live stock carried, names of owners and consignees, the places to and from which such stock is shipped, the manner of handling such live stock, the number of deaths or injuries to live stock occurring in transit or while being loaded or unloaded, with the causes of such deaths or injuries and all other matters which may be deemed necessary by the board for a full and complete record of such shipping and handling of live stock. And also to prohibit the importation into the Territory from any foreign country, or other parts of the United States, or from one island within the Territory to another island therein, or to one locality from another locality on the same island of animals known to be infected with a contagious, infectious or communicable disease or known to have been exposed to any such disease.

"Sec. 504. TERRITORIAL VETERINARIAN. Said board of agriculture and forestry shall have power and authority to appoint a superintendent of animal industry who shall be a competent veterinary surgeon and shall be known as the "Territorial veterinarian."

"He shall have charge, direction and control (subject to the direction and control of the board), of all matters relating to the inspection of animals and the prevention and eradication of contagious, infectious and communicable diseases among animals and of all matters relating to animal industry mentioned in or coming within the scope of this chapter, and such other matters as the board shall from time to time direct. He shall enjoy all the powers, rights, privileges and immunities of an officer of the board of health.

"Sec. 505. LIVE STOCK INSPECTORS. Said board of agriculture and forestry shall have power and authority to appoint and commission one or more live stock inspectors for each judicial circuit and other employees as may be necessary for the proper carrying into effect of the provisions of this chapter and may at its pleasure remove any inspector or employee and fix their compensation.

"Sec. 506. ENTRY OF ANIMALS. No domestic animal shall be allowed to enter the Territory of Hawaii except after inspection by the Territorial veterinarian or in his absence by a live stock inspector, and a permit issued by such inspecting officer to the consignee or owner, provided, however, that no fees for inspection shall be charged, nor delays caused concerning the landing of any domestic animal for which a certificate of health has been issued as prescribed by an act of congress approved February 2nd, 1903, and entitled 'An act to enable the secretary of agriculture to more effectually suppress and prevent the spread of infectious and contagious diseases of live stock and for other purposes.'

"Sec. 507. LANDING NOT AN ENTRY. The landing of any animal for the purpose of inspection or quarantine shall not be construed to be an entry into the Territory for any purpose whatsoever, except as herein provided, and if in the opinion of the inspecting officer it shall be necessary or proper to quarantine any such animal, he shall have authority so to do at the expense of the owner or consignee.

"Sec. 508. QUARANTINE. The board shall have the power to quarantine any domestic animal known to be affected with or to have been exposed to any contagious, infectious or communicable disease, and to destroy the same, when in the opinion of the Territorial veterinarian, or in his absence, a duly qualified veterinary surgeon, such measure is necessary to prevent the spread of such disease, and to provide for the proper disposition of its hide and carcass; and to disinfect premises where any such disease may have existed.

"Sec. 509. MASTER OF VESSEL TO NOTIFY INSPECTORS. The master of any vessel on which there shall have been shipped live animals for any port in this Territory shall immediately, upon arrival, cause the inspecting officers to be notified, and shall not permit the animals to be taken from the wharf or landing, nor any portion of the food or water, nor any effects connected therewith or provided for their use during the voyage, to be removed from the wharf or landing until the inspecting officer shall have inspected and passed the same."

REPEAL OF RULE VII.

Rule VII of this Division which prohibited the transfer of hogs from Oahu to any other island went into effect on July 10, 1913, at a time when hog cholera was prevalent on Oahu and it was necessary to prevent the spread of the disease to the other islands by this quarantine measure.

Since by July, 1917, no case of hog cholera had occurred on Oahu for more than a year, this rule seemed no longer necessary and on the recommendation of the Territorial Veterinarian it was accordingly repealed by the following notice:

NOTICE OF REPEAL OF RULE VII.

Notice is hereby given that Rule VII of the Division of Animal Industry prohibiting the shipment, transfer, or exchange of hogs from the Island of Oahu to any other island of the Territory, adopted by the Board of Commissioners of Agriculture and Forestry and approved by the Governor of Hawaii on July 10, 1913, is hereby repealed and declared to be no longer in effect.

Approved this 28th day of July, 1917.

LUCIUS E. PINKHAM,
Governor of Hawaii.

RABBITS AND BELGIAN HARES.

The 1917 Legislature passed a law (Act 50) forbidding the keeping and breeding of rabbits or Belgian hares in the Territory, except on permit issued by this Board. In accordance with this law, which principally aims at keeping these animals confined and thereby preventing them from becoming pests, a new rule (Division of Animal Industry, Rule XIII) was approved by the Governor on October 30, 1917, since which date 112 permits to keep and breed rabbits have been issued.

The law and regulations follow:

ACT 50

AN ACT

To Repeal Section 544 and to Amend Sections 541, 542 and 543 of the Revised Laws of Hawaii, 1915, Relating to Rabbits and Belgian Hares.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. Section 544 of the Revised Laws of Hawaii, 1915, is hereby repealed.

Section 2. Section 541 of the Revised Laws of Hawaii, 1915, is hereby amended so as to read as follows:

"Section 541. Permit required. The keeping and breeding of rabbits and Belgian hares in the various islands of the Territory is prohibited except upon permit issued by the Territorial Board of Agriculture and Forestry and in accordance with the rules and regulations of said board."

Section 3. Section 542 of the Revised Laws of Hawaii, 1915, is hereby amended so as to read as follows:

"Section 542. Punishment. Any person who shall keep or shall maintain for breeding any rabbits or Belgian hares in any of the islands of the Territory of Hawaii, except as provided in Section 541, as amended, is guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not exceeding one hundred dollars for the first offense, and upon conviction thereof a second time shall be punished by a fine of not exceeding one hundred dollars and imprisonment not exceeding two months."

Section 4. Section 543 of the Revised Laws of Hawaii, 1915, is hereby amended so as to read as follows:

"Section 543. Destruction of unconfined rabbits and Belgian hares. Any police officer or other person is hereby authorized to destroy any rabbit or Belgian hare found unconfined in this Territory, and no officer or other person destroying any rabbits or Belgian hares so found shall be liable for any damages for such destruction to any person claiming the ownership of such animals, provided that no officer or other person shall enter in any inhabited enclosure for the purpose of taking or destroying any rabbits or Belgian hares without authority of law or under a warrant duly issued."

Section 5. This Act shall take effect upon its approval.

Approved this 3rd day of April, A.D. 1917.

LUCIUS E. PINKHAM,
Governor of the Territory of Hawaii.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XIII. DIVISION OF ANIMAL INDUSTRY.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the Keeping and Breeding of Rabbits.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rule and regulation pertaining to the keeping and breeding of rabbits in the Territory of Hawaii in accordance with Act 50 of the Session Laws of Hawaii of 1917:

Sec. 1. Every keeper or breeder of rabbits or hares, whether the same are kept singly, as pets or in numbers for their meat, skins, or other purposes, must obtain from the Board of Agriculture and Forestry a permit to keep or breed rabbits.

Sec. 2. In order to obtain such permit it is neecssary for the applicant to submit to the Board of Agriculture and Forestry an affirmed statement to the effect that he will use due diligence and take every possible precaution to the end that such rabbits, for whatsoever purpose kept, remain confined.

Sec. 3. Applicants for permits must obtain from the said Board or its local representative an application blank to be filled in and returned.

This rule shall take effect upon its approval by the Governor of Hawaii.

Approved this 30th day of October, 1917.

LUCIUS E. PINKHAM,
Governor of Hawaii.

Honolulu, T.H.

DISEASES OF LIVE STOCK

ANTHRAX IN THE TERRITORY OF HAWAII.

The year 1917 became remarkable in the Hawaiian live stock annals on account of the first appearance of anthrax among the cattle and horses of the Territory. This fatal disease, which affects all classes of animals, and is transmissible to man, had never been known here before, and as it could not possibly have been brought here by infected animals, the conclusion was reluctantly arrived at that the disease had been introduced and spread maliciously.

The first appearance of the disease occurred on a ranch at Hanalei, on Kauai, and unfortunately a considerable number of animals had died before the diagnosis of anthrax was made and many carcasses had been buried in shallow graves. Serum vaccine was cabled for and pending its arrival every measure was taken to prevent the further spread of the disease. The cattle were then dying at the rate of ten per day, and it soon became evident that nearly all the paddocks on the ranch had been infected, so nothing could be gained by moving the cattle around. A strict quarantine, enforced by guards, was established, and, as soon as received, the entire herd, some 2400 head, were injected with the serum simultaneous anthrax vaccine. Up to this time some 225 animals, mostly

cows, had died, and a large force of men was required for burning the carcasses and fencing in the graves of the earlier cases. The vaccination did not stop the losses immediately, so it became necessary to revaccinate the whole herd one month later, when a total of about 300 head had died. The disease had then lasted from the beginning of April and was well under control by the middle of May, though a few scattering cases were observed as late as August.

How the disease was scattered over the ranch is not known to this day. The contents of the salt and bonemeal boxes in the infected pastures were tested by animal inoculations without result. Practically all the paddocks are high and well drained and offer little or no opportunity for the permanent establishment of the anthrax infection. This makes the sudden appearance of the disease in that isolated district so much more remarkable.

However, the end was not yet. During the middle of May, anthrax suddenly made its appearance in a dairy herd almost in the heart of Honolulu. Of approximately 100 milch cows, one-third died in the course of 48 hours. The place was quarantined and the remaining animals were serum vaccinated. In this case the disease was found to have been spread by means of a bag of beet pulp, which was found to be heavily infected with anthrax spores. Only this bag out of a shipment of several hundred proved to be infected, and as the feed room at the dairy was left open at all times, the matter of infecting one of the bags of feed by pouring an anthrax culture over it would meet with little difficulty.

The final surprise came, however, when anthrax was reported from the Island of Maui. There in the course of ten days, during the month of June, no less than seven distinct outbreaks occurred in widely scattered districts. The losses, however, were insignificant, totalling less than fifty head of cattle and horses. Whoever scattered the disease in this case had evidently been in a hurry, as well as being ignorant about how to make the infection do the most damage. As in the other outbreaks, all animals in the infected pastures were immediately serum vaccinated, after which few losses occurred. As all of these outbreaks appeared in pastures contiguous to a highway, it is presumed that the fiend who scattered the disease was traveling in a carriage or automobile, and simply throwing the infected material into the paddocks as he passed them. It is needless to say that by this time the cattle raisers and live-stock owners all over the Islands were thoroughly alarmed and unprecedented measures were adopted to protect the large cattle ranches on Hawaii and elsewhere.

The Territorial Legislature was fortunately in session when the first outbreak of anthrax occurred, and an appropriation of $25,000.00 was made immediately available, with which to fight the disease. Had it not been for this expeditious measure it is doubtful

whether the disease could have been suppressed so quickly and completely as was the case.

The serum vaccine used for this purpose is of quite recent origin and would not have been available had the outbreaks happened the year before. Our experience with it has demonstrated it as a valuable preventive and an effective cure in most cases that come under treatment soon enough. It is still rather expensive, costing thirty cents per dose, but it is expected that improved methods of manufacture will greatly reduce this price. A total of 13,000 doses was used, and the results fully justify the expenditure. The greatest item of cost in fighting an anthrax epidemic is the disposal of the carcasses by cremation, and unless this is done, and done thoroughly, there is little likelihood of ever getting rid of the disease, as the anthrax infection can live for years in the ground.

As all the details of the various outbreaks have been published from month to month in the official organ of this Board, it is only necessary to add that the $25,000 appropriation as supplemented later with an additional $1757.00 was expended on the various islands approximately as follows:

Oahu	$8,000.00
Kauai	14,000.00
Maui	4,000.00
Hawaii	1,000.00

To this should be added that the County of Kauai, when the original appropriation was exhausted, contributed at least $3,000.00 and that this Board finally was granted $1500.00 for the continued suppression of the infection on Kauai, from the Governor's contingency fund.

The appended rules, regulations and "By Authority" notices will further illustrate the means whereby the infection was fought and suppressed.

ACT 162

AN ACT

Making an Appropriation for the Control, Suppression and Eradication of the Diseases known as Anthrax and Hemorrhagic Septicemia.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. The sum of twenty-five thousand dollars ($25,000.00) or so much thereof as may be necessary is hereby appropriated from any funds available in the Territorial treasury for the purpose of controlling, suppressing and eradicating in the Territory of Hawaii the acute, infectious and contagious diseases of men and beasts known as anthrax and hemorrhagic septicemia.

Section 2. The amount hereby appropriated shall be immediately available and shall be under the control of and expended by the Board of Commissioners of Agriculture and Forestry.

Section 3. This Act shall take effect upon its approval.

Approved this 27th day of April, A.D. 1917.

LUCIUS E. PINKHAM,
Governor of the Territory of Hawaii.

BY AUTHORITY.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE X. DIVISION OF ANIMAL INDUSTRY.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the quarantine of all domestic animals on the Island of Kauai on account of anthrax and Hemorrhagic Septicemia.

Owing to the fact that diseases known as Anthrax, or Charbon, and Hemorrhagic Septicemia, which affect most classes of domestic animals, and the former of which may be transmitted to man, have made their appearance on the Island of Kauai, it is hereby ordered:

Sec. 1. That there is hereby declared a quarantine of the Island of Kauai, and no domestic or other animal of any class or kind shall be shipped from nor be allowed to leave the Island of Kauai until this quarantine has been lifted by the Board of Agriculture and Forestry.

Sec. 2. That the Territorial Veterinarian shall proclaim special quarantine on such sections of the Island of Kauai where these diseases are prevalent. Such special quarantine to be enforced in accordance with the direction of the Territorial Veterinarian.

Sec. 3. That it shall be the duty of any person, or persons, whether owner of live stock or not, to report without delay the appearance of any kind of disease among live stock to the Territorial Veterinarian, his assistant or deputy, as well as to assist him in every way to locate, control and suppress any and all cases of the diseases in question.

Sec. 4. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed five hundred dollars ($500.00), as provided by Sec. 529, Revised Laws of Hawaii of 1915.

This rule shall take effect upon its approval by the Governor of Hawaii.

Approved this 20th day of April, 1917.

LUCIUS E. PINKHAM,
Governor of Hawaii.

Honolulu, T.H.

BY AUTHORITY.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XI. DIVISION OF ANIMAL INDUSTRY.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the quarantine of all domestic animals on the Island of Oahu, on account of Anthrax and Hemorrhagic Septicemia.

Owing to the fact that diseases known as Anthrax or Charbon, and Hemorrhagic Septicemia, which affect most classes of domestic animals and the former of which may be transmitted to man, have made their appearance on the Island of Oahu, it is hereby ordered:

Sec. 1. That there is hereby declared a quarantine of the Island of Oahu, and no domestic or other animal of any class or kind shall be shipped from or be allowed to leave the Island of Oahu until this quar-

antine has been lifted by the Board of Agriculture and Forestry, except on a written permit from said Board.

Sec. 2. That there is hereby declared a further quarantine on the area bounded by the following streets and lanes in the District of Honolulu, City and County of Honolulu, Island of Oahu; beginning at the north-east corner of Beretania and Artesian Sts., thence along the east side of Artesian St., thence along the south side of Bingham St., thence across Metcalf St. and along the northern side of Metcalf St. as far as the College of Hawaii grounds, thence across Metcalf St. and along the eastern side of the lane leading from Metcalf St. at the entrance to the College of Hawaii grounds, in an easterly and southerly direction past the Moiliili Rock Quarry to Beretania St. near the junction of King and Beretania Sts, thence along the northern side of Beretania St. to the point of beginning. No domestic or other animal of any class or kind shall be allowed to enter and/or leave the above described district until further notice from the Board of Agriculture and Forestry.

Sec. 3. That the moving or transfer of any dairy animal from one dairy to another or from one pasture to another within the Honolulu District, from Maunalua to Moanalua, is prohibited until further notice from the Board of Agriculture and Forestry.

Sec. 4. That it shall be the duty of any person, or persons, whether owner of live stock or not, to report without delay the appearance of any kind of disease among live stock to the Territorial Veterinarian, his assistant or deputy, as well as to assist him in every way to locate, control and suppress any and all cases of the diseases in question.

Sec. 5. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed five hundred dollars ($500.00), as provided by Sec 529, Revised Laws of Hawaii of 1915.

This Rule shall take effect upon its approval by the Governor of Hawaii.

Approved this 25th day of May, 1917.

LUCIUS E. PINKHAM,
Governor of Hawaii.

Honolulu, Territory of Hawaii.

BY AUTHORITY.

NOTICE OF CHANGE IN ANTHRAX QUARANTINE AREA.

Notice is hereby given that, effective at noon on June 5, 1917, the quarantine area described in Sec. 2 of Rule XI of the Division of Animal Industry of the Board of Commissioners of Agriculture and Forestry approved by the Governor on May 25th, 1917, is reduced to the area described as follows:

Beginning at the West corner of Wilder Avenue and Metcalf Street, and running as follows:

1. Northeasterly 765 feet more or less to the Northeast corner of Metcalf and Marques Streets;
2. Easterly 131 feet along Metcalf Street;
3. Southerly 256 feet across Metcalf Street and along the West side of 11 ft. lane;
4. Easterly 11 feet across lane to fence;
5. Southerly 23 feet along fence to stone wall on top of bluff;

6. Southeasterly 190 feet down face of bluff and around base of sloping land to small bridge;
7. Southeasterly 560 feet along ditch along base of sloping land to premises of K. Matsumoto;
8. Southwesterly 40 feet along fence along premises of K. Matsumoto;
9. Southeasterly 117 feet along same;
10. Southwesterly 511 feet more or less along the Northwest side of lane to Beretania Avenue;
11. Northwesterly 1065 feet along the mauka side of Beretania Avenue;
12. Northeasterly 236 feet along fence and cultivated ground to angle in ditch;
13. Northeasterly 630 feet along ditch;
14. Northerly 65 along ditch to a point near base of sloping land;
15. Northwesterly 654 feet along ditch;
16. Northeasterly 172 feet along ditch;
17. Northwesterly 215 feet along ditch and across to the North side of Metcalf Street;
18. Northeasterly 420 feet along Metcalf Street to the initial point.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Honolulu, T. H., June 5, 1917.

BY AUTHORITY.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XII. DIVISION OF ANIMAL INDUSTRY.

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the quarantine of all domestic animals on the Island of Maui, on account of Anthrax and Hemorrhagic Septicemia.

Owing to the fact that diseases known as Anthrax or Charbon and Hemorrhagic Septicemia, which affect most classes of domestic animals, and the former of which may be transmitted to man, have made their appearance on the Island of Maui, it is hereby ordered:

Sec. 1. That there is hereby declared a quarantine of the Island of Maui, and no domestic or other animal of any class or kind or their products shall be shipped from or be allowed to leave the Island of Maui until this quarantine has been lifted by the Board of Agriculture and Forestry, or on written permit from said Board.

Sec. 2. That the Territorial Veterinarian or his deputy shall proclaim special quarantine on such sections of the Island of Maui where these diseases may prevail. Such special quarantine to be enforced in accordance with the direction of the Territorial Veterinarian or his deputy.

Sec. 3. That it shall be the duty of any person, or persons, whether owner of live stock or not, to report without delay the appearance of any kind of disease among live stock to the Territorial Veterinarian, his assistant or deputy, as well as to assist him in every way to locate, control and suppress any and all cases of the diseases in question.

Sec. 4. Any person violating the above rule shall be guilty of a

misdemeanor and upon conviction thereof shall be punished by a fine not to exceed five hundred dollars ($500.00), as provided by Sec. 529, Revised Laws of Hawaii of 1915.

This rule shall take effect upon its approval by the Governor of Hawaii.

Approved this 13th day of June, 1917.

LUCIUS E. PINKHAM,
Governor of Hawaii.

Honolulu, Territory of Hawaii.

BY AUTHORITY.

NOTICE.

The quarantine placed on the Island of Oahu by Rule XI of the Division of Animal Industry, approved on May 25, 1917, which forbade the shipping of animals from Oahu, is hereby lifted and the other provisions contained in said rule are no longer in effect

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Honolulu, October 29, 1917.

BY AUTHORITY.

NOTICE.

The quarantine placed on the Island of Maui by Rule XII of the Division of Animal Industry, approved on June 13, 1917, which forbade the shipping of animals from Maui, is hereby lifted with the exception that a permit must be obtained from the Deputy Territorial Veterinarian for the shipment of animals from infected areas on Maui. The other provisions contained in said rule are no longer in effect.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Honolulu, October 29, 1917.

BY AUTHORITY.

TERRITORY OF HAWAII.—BOARD OF AGRICULTURE AND FORESTRY.

IN RE THE REMOVAL OF THE QUARANTINE GUARDS AT KALIHI-KAI AND HANALEI BRIDGE AND RESTRICTING THE ENTRANCE OF LIVE STOCK INTO THE QUARANTINED AREA.

Section I. Rule X of the Division of Animal Industry, pertaining to Anthrax on the Island of Kauai, with subsequent amendments, remains in force.

Section II. The removal of the quarantine guards from Kalihiwai and Hanalei Bridge does not constitute a removal of the quarantine of the infected district, except as hereinafter specified.

Section III. All fenced and anthrax-infected pastures, enclosures or premises remain quarantined in so far as the admission to them of unvaccinated animals is concerned, and such pastures, enclosures or premises must be kept so fenced as to prevent absolutely entrance of stray live stock from adjoining highways and districts.

Plate 11.

Grade Holstein Heifer Showing Medium-sized Reaction to the Intrapalpebral Tuberculin Test.
Autopsy revealed a few nodules in the diaphragmatic lobe of the right lung and posterior mediastinal gland.

Section IV. All gates opening on public roads or non-infected premises shall be securely fastened and be provided with a sign forbidding the admission of unvaccinated live stock to anthrax-infected districts, and stating the penalty for the violation of the rules and regulations governing the same.

Section V. The Kalihi-kai and Kalihiwai districts, and the public highway leading from the latter to Hanalei bridge, shall be considered free from anthrax infection and no longer quarantined after the date these regulations become effective; but the local representative of this Board shall restablish such quarantine, in full or in part, whenever in his opinion it becomes advisable.

Section VI. The removal of the vaccinated live stock in the quarantined district shall be in direct charge of the local representative of this Board, who shall in each case decide upon and superintend the application of such precautionary measures as he may deem requisite to prevent spread of infection.

Section VII. It shall be the duty of any person to report without delay to the local representative of this Board the sickness or death of any animal in or near the infected district, as well as the presence of any unvaccinated live stock in the quarantined area.

Section VIII. It shall be unlawful for anyone, directly or indirectly to transfer or carry from any pasture, enclosure or premises, where an animal has died from anthrax, or where deaths of animals have occurred which might be attributed to anthrax, any soil, sod, earth, grasses, grass seed, grass roots or any other substance which might possibly carry the infection of anthrax.

Section IX. These rules shall go into effect on August 26th, 1918.

By direction of the Board of Agriculture and Forestry.

VICTOR A. NORGAARD,
Territorial Veterinarian.

Any violation of these rules is punishable by a fine not to exceed $500.00 (Section 529, R.L.H. 1015).

BOVINE TUBERCULOSIS CONTROL.

During the last biennial period considerable progress was made in the eradication of bovine tuberculosis. Less tuberculosis was found in those dairies known to be heavily infected than at any time in their previous history. This is indeed encouraging and with the help of recent regulations by this Board relative to the importation of cattle from other countries and a most liberal indemnification act passed by the 1917 Territorial Legislature, we may look forward to the complete eradication of this disease from the dairy herds of the Territory in a reasonable period of time.

The revised regulations of this Division, governing the importation of live stock and other animals into this Territory contain the following important rule:

"Rule V. Cattle for Breeding and Dairy Purposes.

"Sec. 1. All cattle six months old or over intended for importation into the Territory of Hawaii must be accompanied by a certificate of health issued or approved by a veterinary officer in the United States Bureau of Animal Industry or by the State Veterinarian for the state or district where the cattle in question are located, to the effect (a)

that the animals are free from bovine tuberculosis as proved by the tuberculin test, and (b) that they have not been in contact, directly or indirectly, with any cattle not proven by a tuberculin test to have been free from tuberculosis for at least one year prior to date of shipment.

"Sec. 2. All cattle conforming with 'a' of Sec. 1, but failing to qualify for 'b' may be landed in quarantine and held for re-test and further disposal by the Territorial Veterinarian, as by law provided for animals that have been exposed to infection.

"Sec. 3. Calves less than six months old and not accompanying their dams must be accompanied by a certificate issued or approved as in Sec. 1 described, and to the effect that they have come from tuberculin tested mothers and have not been exposed to infection of tuberculosis since birth. Otherwise they shall be dealt with as in Sec. 2 provided for."

The strict enforcement of this regulation will compel importers to buy cattle from tuberculosis-free accredited herds or else submit to the quarantine and retesting of their stock upon arrival, with all the expense connected therewith. The length of such quarantine period will depend primarily upon the amount of disease present in the herd or herds from which such animals originate.

Through the quarantine and testing of all cattle from suspicious herds, sources of infection from the outside will be eliminated which will materially aid in the eradication of tuberculosis from this Territory.

The enforcement of such a regulation may well be considered an indirect aid to the Federal Bureau of Animal Industry in its efforts to eradicate the disease from the United States and to establish tuberculosis-free herds especially in the Pacific Coast States.

LEGISLATION AIDING BOVINE TUBERCULOSIS CONTROL AND ERADICATION.

The 1917 Territorial Legislature passed the following act for the indemnification of owners of condemned tuberculous cattle:

ACT 121.

AN ACT

TO PREVENT, SUPPRESS AND ERADICATE BOVINE TUBERCULOSIS AND TO PROVIDE FOR THE INDEMNIFICATION OF OWNERS OF CATTLE DESTROYED UNDER THE PROVISIONS OF THIS ACT.

Be it Enacted by the Legislature of the Territory of Hawaii:

Bovine tuberculosis, a disease transmissible to human beings, and especially to children, through the consumption of milk from tuberculous cows, being prevalent in the Territory of Hawaii, the board of commissioners of agriculture and forestry is hereby authorized and empowered to take the following measures for the prompt prevention, suppression and eradication of bovine tuberculosis:

Plate 12.

Purebred Jersey Heifer Showing Small Reaction to the Intrapalpebral Tuberculin Test. Autopsy revealed lesions of tuberculosis in both retropharyngeal glands, all lobes of the lungs and the mediastinal and left bronchial glands.

Section 1. All dairy cattle within this Territory more than six months old, shall be tuberculin-tested, and when found to be affected with bovine tuberculosis, either upon physical examination or by means of the tuberculin test shall be branded on the left cheek with the registered brand "T.R.," and segregated in a manner satisfactory to the said board, and shall be slaughtered within a time and place designated by an officer of the board, under the supervision of the territorial veterinarian, his assistant or deputy; and the carcass of any such animal shall be disposed of according to the meat inspection regulations of the U. S. Bureau of Animal Industry.

Section 2. All such cattle shall be appraised before being slaughtered, the owner to be indemnified as hereinafter provided for.

Section 3. The president of the board of agriculture and forestry shall designate an appraiser who by and with the advice of the territorial veterinarian, his assistant or deputy shall appraise each tuberculous animal within five days prior to the date of slaughter, basing the amount upon the class and market value of the animal at the time of the appraisal, whether for breeding purposes or for meat or milk production. Animals reacting to the tuberculin test, but not exhibiting any physical evidence of tuberculosis shall be appraised without considering the presence of a diseased condition, but animals exhibiting physical evidence of tuberculosis shall be appraised as diseased animals.

Section 4. The amount of indemnification shall in no case exceed one hundred and fifty dollars for each animal, and all payments thereof shall be made upon vouchers approved by the president of the board of agriculture and forestry; provided, that no payment shall be made for an animal which has been in the Territory for a period of less than six months prior to the date of slaughter.

Section 5. If the amount of appraisal of any animal, as determined by the appraiser designated, is not satisfactory to the owner, he may protest against the same, whereupon a board of three appraisers is to be formed, one of whom shall be designated by the president of the board of agriculture and forestry, one to be selected by the owner, and the third to be selected by these two. The value of the animal to be appraised decided upon by these three appraisers, or by two of them, shall be regarded as final.

Section 6. Compensation for all appraisers appointed or selected pursuant to this Act, shall not exceed five dollars per diem, and such compensation and their necessary travelling expenses shall be paid upon vouchers approved by the president of the board of agriculture and forestry.

Section 7. Following the appraisal of the tuberculous animals the amount of reimbursement shall be determined in accordance with the results of the post mortem inspection as follows:

(a) If any animal is found upon post mortem examination not to be affected with tuberculosis, the carcass and other edible portions shall be passed for food and the owner shall sell the same including all accompanying parts at a fair market price which price shall be deducted from the amount of appraisal and the balance, if any, thus remaining, shall be paid as hereinafter provided.

(b) If any animal is found upon post mortem examination to be affected with tuberculosis and the lesions are such that the carcass and parts are passed for food, the owner shall sell the same at a fair market price which price shall be deducted from eighty per cent of the appraised value and the balance, if any, thus remaining, shall be paid as hereinafter provided for.

(c) If any animal upon post mortem examination is condemned for offal the owner shall sell the hide at a fair market price which price shall be deducted from fifty per cent of the appraised value and the balance, if any, thus remaining, shall be paid as hereinafter provided for.

Section 8. Any premises upon which there have been kept animals affected with tuberculosis shall be disinfected promptly after the removal of such animals and in a manner satisfactory to the territorial veterinarian, his assistant or deputy, at the expense of the owner.

Section 9. The sum of twenty thousand dollars ($20,000.00) is herewith appropriated for the purpose of this Act.

Section 10. This Act shall take effect upon its approval.

Approved this 23rd day of April, A.D., 1917

LUCIUS E. PINKHAM,

Honolulu, Territory of Hawaii. Governor of Hawaii.

The above act became law on April 23, 1917, and went immediately into effect.

Since becoming effective 407 condemned cattle on the island of Oahu have been slaughtered in accordance with its provisions. Of this number, compensation was paid on 372. No compensation was paid on 35, as the beef value was in excess of 80% of the appraised value.

The following figures give the amounts of the appraised value, beef value and indemnification:

1917.

No. Condemned	Total Appraisal Value	Total Beef Value	Total Compensation
407	$40,265.00	$17,674.66	$14,596.75

The above figures show that the dairymen have received from the Territory and the butchers a total of $32,271.41 for their condemned tuberculous cattle, or an average of $83.76 a head; in other words, 84.6% of the average appraised value.

To this Territory belongs the credit of having the most liberal indemnification law to be found anywhere in the United States. Through its provisions this government has materially aided the dairymen in their efforts to clean up their herds and in the main this aid has been appreciated. Still it cannot be said that all opposition to the tuberculin test has ceased. However, as those who most consistently opposed the passage of this measure and who have placed every difficulty in the way of our efforts to eradicate bovine tuberculosis have not been at all backward in demanding the utmost compensation for their condemned animals when forced to have their herds tested, we are confident that all opposition to measures now in force will soon cease.

RESULTS OF THE 1917-1918 TUBERCULIN TEST.

Investigations relative to the prevalence of tuberculosis among the dairy cattle of the City and County of Honolulu carried

on during the biennial period ending December 31, 1918, have revealed some very interesting data concerning the amount of the disease still present, the amount of disease brought in from abroad, despite the required tuberculin test certificate before importation, and the efficiency of the method of testing in use here.

During the period under review, a total of 9,577 head of dairy stock were tested, out of which number 9,124 were passed as free from disease and 453 condemned as tuberculous. The percentage of tuberculosis for the entire period was found to be 4.73% Of the 453 condemned cattle only 3 remain alive. They are now segregated and are being conditioned for slaughter.

Below is given a tabulation of the 1917 and 1918 tests:

1917

No. of dairies tested	45	
" " " with no reactors	25	
" " cattle tested	4,004	
" " " passed	3,720	
" " " condemned	204	
Percentage of tuberculosis		7.09%
New dairies tested	15	
" " with no reactors	13	
No. of cattle tested	124	
" " " condemned	5	

1918

No. of dairies tested	133	
" " " with no reactors	96	
" " cattle tested	5,573	
" " " passed	5,404	
" " " condemned	169	
Percentage of tuberculosis		3.03%
New dairies tested	50	
" " with no reactors	39	
No. cattle tested	422	
" " condemned	18	

The high percentage of tuberculosis noted in 1917 would seem to indicate an increase of the disease among the dairy herds, but this apparent increase was due to the outbreak of anthrax which occurred in that year and which put a stop to tuberculin testing for some time, consequently this work was confined principally to those dairies known to be infected.

That this is the correct interpretation of this high percentage is evidenced by the results of a more complete test made the following year, 1918, which brought the percentage of tuberculosis down to 3.03%. A still further decrease would have been noted if the thousand or more range dairy stock at Kahuku had been tested and had it not been for a large number of dairy cattle imported from tuberculous herds on the mainland, which when tested here proved to be diseased.

On the island of Hawaii, Dr. H. B. Elliot reports that

a total of 1,308 head of cattle in 343 dairies were tested during the biennial period, out of which number 1,271 were passed and 37 condemned and branded, the percentage of reactors being 2.7%.

All of the above reactors have been slaughtered. Twenty-eight head being condemned after Act 121 went into effect were slaughtered under the provisions of said act. The total appraised value, beef value and compensation paid were as follows:

No. Condemned	Appraisal Value	Beef Value	Compensation Paid
28	$2,365.00	$1,120.47	$848.01

The owners received a total of $1,968.48 (beef value and compensation) for their condemned cattle, or an average of $70.30 per head, which price represents 83.2% of the average appraised value.

Dr. Elliot has found the indemnification act of great assistance in his tuberculosis work. To quote from his report on the subject:

"Although the actual amount of compensation paid to owners is not large, the introduction of this factor into the work of administration has been of remarkable assistance. The cooperation of the owner in work of this nature is an indispensable element of success, and one which can only be secured by fair treatment. No complaints have been received in regard to appraisals or the amount of compensation, and it appears to be generally recognized that the provisions of the act are equitable in these respects."

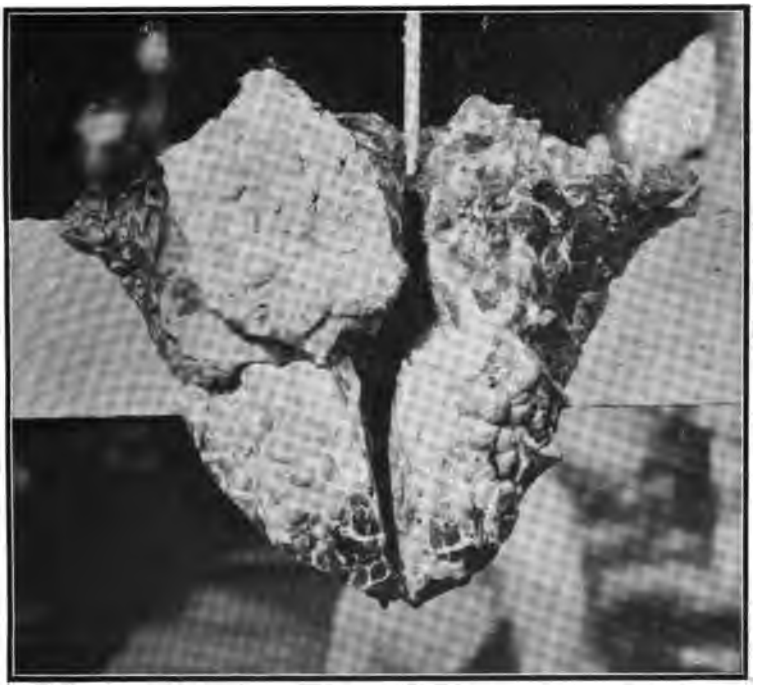
On the island of Kauai the tuberculosis control work was confined to the testing of one dairy herd in which 12 head were condemned, branded and slaughtered, the owner being indemnified in the sum of $387.78. That a better showing was not made on this island was due in part to the severe outbreak of anthrax which occurred in 1917 and which engaged the entire time of the veterinarian stationed there.

Practically nothing has been accomplished in tuberculosis eradication on the island of Maui during the period under review, which is due largely to the work of eradicating anthrax which appeared in seven distinct outbreaks on that island.

In summing up the work of the Division in eradicating bovine tuberculosis, it may be stated that while this work was hindered to a considerable extent on the islands of Kauai and Maui because of serious outbreaks of anthrax, still satisfactory progress has been made.

A total of 493 tuberculous animals have been eliminated from the dairy herds of the Territory, of which number 447 were appraised and slaughtered under the provisions of Act 121. The owners of these cattle received indemnification in the sum of $15,832.54 and salvage to the amount of $19,091.35, making a total of $34,932.89, an average of a trifle over $78.00 per head.

Plate 13.



Large Masses of Tubercles in the Lungs of the Jersey Heifer Shown in Plate 12.

THE INTRAPALPEBRAL TUBERCULIN TEST.

The ideal tuberculin test is that test which can be easily and quickly applied with the least discomfort to the patient; which has the highest degree of accuracy with the widest limits of application and the results of which can be least easily obscured.

The efficiency of any method of testing depends primarily upon the purity and potency of the tuberculin used. Of equal importance is the technique of the operator, his knowledge of the method used and his ability to judge reactions. On this ability to judge reactions will depend the percentage of autopsies showing positive lesions which percentage will be the deciding factor in the accuracy of the method employed.

This Division has for the past eight years used the intradermal tuberculin test in the control and eradication of bovine tuberculosis, first using the sub-caudal fold as the point of injection following the original French method and later using the palpebral fold of the lower eyelid, a method of intradermal injection original here and now officially recognized by many States.

The many advantages of this method of testing have been dealt with at length in former reports; suffice it to say here that the method has proved itself eminently satisfactory and highly efficient in the detection of tuberculosis and conforms most nearly to the ideal tuberculin test elsewhere described.

A few illustrations including the three types of reactions, i.e., large, medium and small, met with in the intrapalpebral tuberculin test are given with notations describing the extent of the lesions in each case.

RESULTS OF AUTOPSIES ON 411 CONDEMNED CATTLE.

The accuracy of the intrapalpebral tuberculin test can best be illustrated by the results of autopsies made on cattle condemned by this method.

Out of 411 cattle condemned for tuberculosis, 409 revealed positive lesions of the disease on autopsy. In the remaining 2, no such lesions could be demonstrated although in one case all the lymph glands in the body were enlarged to double their normal size.

This gives an error of 0.48%, or in other words, the intrapalpebral tuberculin test has proven accurate in 99.52% of cases. Of course, it is realized that no sweeping assertions regarding the accuracy of any method of testing can be based upon so few examinations, but the number of correct results so far obtained would seem to indicate a high degree of efficiency for this particular method.

The distribution of lesions in the various organs of the body in the 409 positive cases above referred to is as follows:

Right sub-maxiliary gland	4	times
Left sub-maxiliary gland	8	"
Right sub-parotid gland	5	"
Left sub-parotid gland	8	"
Right retro-pharyngeal gland	118	"
Left retro-pharyngeal gland	117	"
Right pre-scapular gland	13	"
Left pre-scapular gland	5	"
Anterior mediastinal gland	121	"
Posterior mediastinal gland	201	"
Right bronchial gland	29	"
Left bronchial gland	29	"
Apical lobe right lung	55	"
Costal lobe right lung	45	"
Diaphragmatic lobe right lung	101	"
Diapragmatic lobe left lung	119	"
Costal lobe left lung	38	"
Apical lobe left lung	41	"
Oesophageal glands	27	"
Costal pleura	19	"
Liver	5	"
Portal glands	12	"
Mesenteric glands	80	"
Sub-lumbar glands	1	"
Right inguinal gland	1	"
Left inguinal gland	1	"
Udder	2	"
Supra-mammary glands	10	"

It will be noticed from the above tabulations that lesions of tuberculosis occurred in the udder and supra-mammary glands in about 3% of cases.

A large number of very valuable museum specimens of tuberculous lesions in various internal organs have been obtained. These are proving of considerable educational value, offering concrete illustrations of various forms of the disease, its wide dissemination throughout the body and the danger it may become to the milk supply.

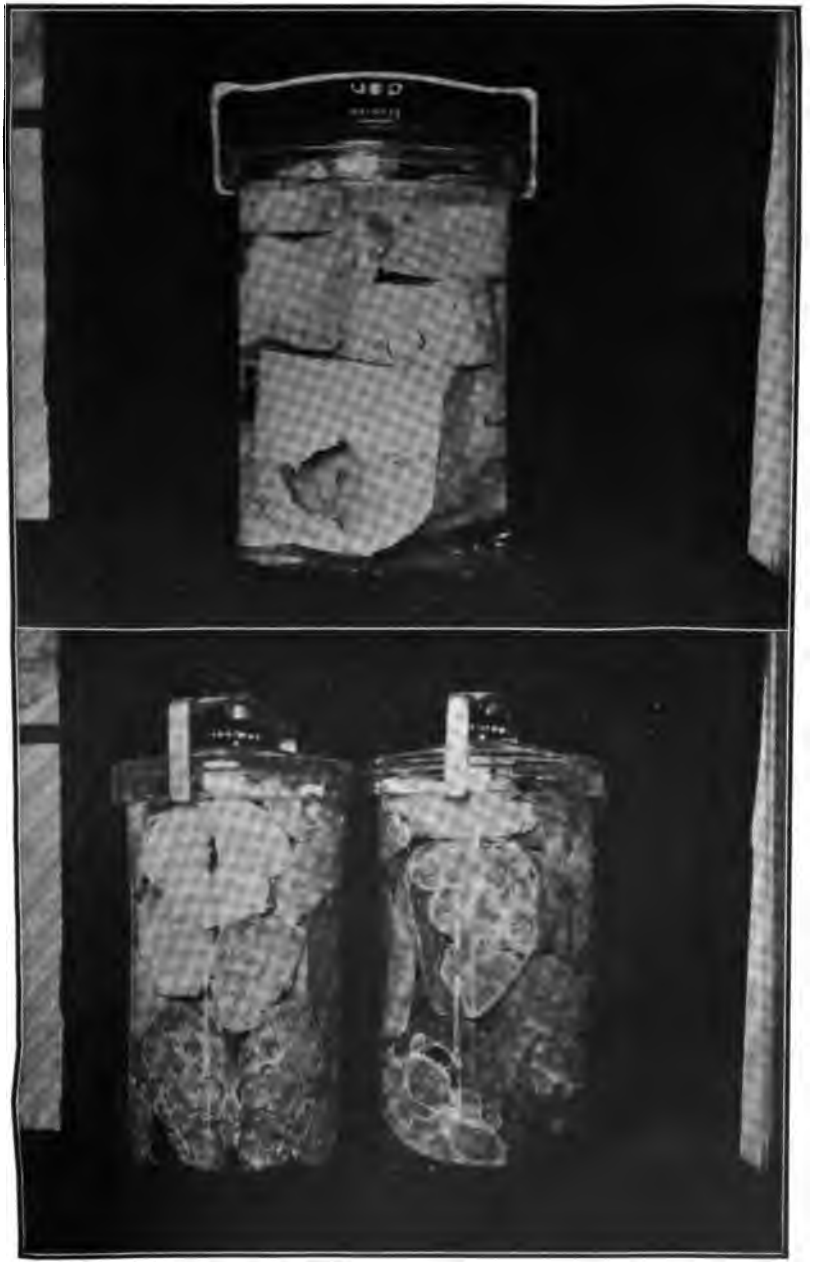
TUBERCULOSIS-FREE ACCREDITED HERDS.

Following the recent policy of the Federal Bureau of Animal Industry in the establishment of tuberculosis-free accredited herds on the mainland of the United States, this Division is now in a position to list 47 dairy herds in the Territory as being free from tuberculosis.

A dairy herd to be listed as an accredited tuberculosis-free herd must have passed successfully two or more annual or semi-annual tuberculin tests. And, furthermore, no herd shall be classified as an accredited herd in which tuberculosis has been found by means of the tuberculin test until such herd has passed successfully two consecutive tests dating from the time of the removal of the last reacting animal or animals.

There are a number of dairy herds in the Territory which have not had a reactor in the past six or seven years as proven by

Plate 14.



Upper Jar: Portions of Udder of Cow Afflicted with Generalized Tuberculosis. The nodules all through this gland can be distinctly seen.

Lower Jar: Specimens of Lungs and Lymph Glands taken from Condemned Tuberculous Cattle, Showing Increased Size of Glands and Lesions.

annual and semi-annual tuberculin tests, and such dairies are entitled to all the benefits accruing from being listed as tuberculosis-free accredited herds.

OTHER LIVE STOCK DISEASES.

With the exception of anthrax and tuberculosis, the live stock of the Territory have been singularly free from infectious diseases during the past year. A few isolated cases of glanders have been reported from the Kohala district, but a similar outbreak recently investigated in the Hamakua district proved not to be glanders, but epizootic lymphangitis. Hog cholera seems to have entirely disappeared, and even hemorrhagic septicemia or swine plague is rarely heard of, and still there were more hogs raised in the Territory during the past year than ever before.

Though rabies is still prevalent in the Pacific Coast States, the continued four-months quarantine of all dogs has proved effective in keeping the disease out of the Territory. It became necessary to enlarge the dog quarantine division with twelve additional kennels.

REPORT OF THE DEPUTY TERRITORIAL VETERINARIAN FOR EAST HAWAII

H. B. Elliot, M.R.C.V.S.

GENERAL OBSERVATIONS.

The statistics covering the occurrence of contagious and infectious diseases among the live stock of this district reveal a continuance of the very satisfactory conditions noted in the last biennial report. Particular emphasis is again laid upon the remarkable freedom of our equine live stock from the respiratory diseases of the influenzoid type which have been very prevalent on the mainland and have caused serious monetary losses to the United States and foreign countries. Our own exemption in this respect is undoubtedly the direct and most important result of improved methods of inspection and sanitary regulations.

The Island of Hawaii was fortunate, also, in escaping the outbreaks of anthrax which occurred in 1917 upon other islands of this group. A good deal of alarm was naturally manifested by owners of live stock, and for several months all cases of sudden

death attended by suspicious circumstances were reported. Where it was possible, investigations of these cases by field post-mortem and laboratory examinations were made, but in every case with negative results so far as anthrax was concerned.

During a part of the time covered by this report the writer was absent from the Territory, and the work of the office was conducted, first, by Dr. L. N. Case, Assistant Territorial Veterinarian, and for a later period by Dr. O. B. Shipman, of Hilo.

LIVE STOCK BREEDING AND IMPROVEMENT.

Recent experience has plainly demonstrated the great importance of endeavoring to make these islands self-supporting in the matter of food supplies, and particularly those derived from live stock industry products. Our yearly bill for imported dairy products alone would support comfortably a profitable industry in this Territory. There are great possibilities along these lines, and evidences of successful accomplishment deserve to be recorded.

Horses and Mules. The number of horses in use has been considerably lessened by the universal adoption of automobile transportation, and the principal demand now is for saddle animals for plantation work. There is a plentiful supply of good type animals from the local ranches to meet this demand.

Up to the present time all of the heavier mules required for wagons and field plowing and cultivation on the sugar plantations have been imported from the mainland. Owing to the marked success which has attended the efforts of the Parker Ranch to breed mules of a type suitable for work of this nature this should not be necessary in the future. On the occasion of two visits to this ranch last year I had the pleasure of seeing a large number of four year old mules which compared very favorably in weight and conformation with those imported from abroad. Forty of these mules were purchased by plantations in this district and are reported to be giving excellent satisfaction.

Cattle. The remarkable improvement in the quality of beef cattle produced in all parts of the Territory has been sufficiently demonstrated at the Territorial and County Fairs held during the past few years, and needs no further commendation. This forms a striking contrast to the primitive and inefficient methods of dairying on this island. A large number of milch cows have been killed for their beef value owing to the high price of feed stuffs during the past year. On the face of an increasing population the milk supply in Hilo and the surrounding districts has decreased thirty per cent during the last four years. When it is considered that my estimate in 1914 was that the daily production of milk did not exceed one quart for every ten persons it is evident that the further reduction of this entirely inadequate supply con-

stitutes a very serious problem in a country afflicted with an excessive infant mortality. The high price of feedstuffs is only partly responsible for this falling off in production. The milk business is gradually being monopolized by the industrious alien content with a too small margin of profit. Milk can be produced at the present price of eleven to twelve cents a quart with a small apparent profit, but the margin is too far restricted to cover interest upon capital invested, necessary allowances for depreciation, and maintenance and improvement of the quality of the live stock. Under these circumstances the most serious depreciation is inevitably that of the quality of the livestock. The dairyman, impelled by his own necessity, careless of the future, relies upon bulls of the poorest scrub type to perpetuate his stock. This cannot continue indefinitely because deterioration in the quality of stock is bound to result in increased cost of production. The solution of this phase of the problem depends upon the introduction of good pure bred bulls either by state aid, cooperation among the dairymen, or the establishment by private capital of a modern, well managed dairy upon a scale large enough to provide continuous betterment. Conditions are even less hopeful in the butter making industry. The initial difficulty of providing home grown forage crops has not been overcome, and butter cannot be produced profitably from imported feedstuffs fed to inferior grades of milch cows.

It is proper that a brief reference to the sanitary conditions in the milk dairies should be made. The methods of production, handling, and distribution show a great improvement in recent years. Milk is produced from healthy animals, the methods of milking are reasonably clean, containers are sterilized by boiling, and, so far as can be seen, there is honest compliance with the sanitary regulations. The principal defect lies in the absence of facilities for cooling milk after it is drawn from the cow.

Hogs. Hog raising has not been engaged in on a large scale in this district, although there are a considerable number of owners in a small way of business. From time to time a few pure bred boars and sows of the Duroc-Jersey, Berkshire and Poland-China breeds have been imported, and their influence has gradually improved the quality of the stock.

Poultry. The reviving interest in this industry which was very manifest a few years ago has been almost entirely eliminated by the high cost of feed, and the stock of poultry has been much reduced during the past twelve months. On the other hand, the poultry farm established by Mr. Harold Fisher, at Keaau, Puna, is a notable illustration of successful achievement by the use of sufficient capital combined with efficient and industrious management. Mr. Fisher deserves credit for demonstrating that it is

possible in this Territory to establish a large poultry farm with a sufficient egg production to make it commercially profitable, and, further, that by careful attention to hygiene and sanitation the investment can be made a reasonably safe one.

DISEASES OF LIVE STOCK.

Horses and Mules

Endemic Catarrh. A horse brought to Hilo in 1917 from one of the other islands showed symptoms of a mild catarrh. This spread rapidly among the other animals in the stable in which he was confiend, made its appearance in the stables of a neighboring plantation, and was afterwards seen at other more distant points. The outbreak was of a very mild and benign nature, and caused no losses, but the incident is significant because it throws some light upon the transmission of these diseases.

Tetanus. Only three cases of this disease were seen during the period under review.

Cerebro-Spinal Meningitis. For several years the windward coast has been free from this disease, and the only outbreaks that have been noted have occurred in the Kau and South Kohala districts. During this period one case came under my observation.

Osteoporosis. This disease, once very prevalent in the wet districts of Hawaii, has completely disappeared, and no cases have been seen for several years.

Epizootic Lymphangitis. During my absence from the Territory an outbreak of this disease involving a number of animals in the Hamakua district was the subject of investigation by Drs. Norgaard and Shipman.

Cattle

Liver Fluke. In former years this parasite was very rarely seen in this district. Slaughterhouse reports and my own observations convince me that it is now widely distributed among the herds grazing in the pastures running along the edge of the forest reserves on the slopes of Mauna Kea. This constitutes a distinct menace to the large ranches mauka of the forest line, and great care should be exercised in the introduction of fresh stock upon these lands. Where the supply of feed is constant and of sufficient quantity the economic loss from fluke is not excessive, but its presence upon lands subject to occasional drought where feed runs short for several months might easily prove disastrous.

Hogs

Swine Plague. So far as can be ascertained the losses from this source have been comparatively small during the past two years.

Board of Agriculture and Forestry

PUBLICATIONS FOR DISTRIBUTION, 1919.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P.O. 207, Honolulu, Hawaii.

BOARD

*Reports of the Commissioner of Agriculture and Forestry for 1900 and 1902, and First Report of the Board of Commissioners of Agriculture and Forestry, 1904.

Reports of the Board of Commissioners of Agriculture and Forestry for the years 1905, 1906, 1907, 1908, and biennial periods 1910, 1912, 1914, 1916, 1918.

"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.

"Digest of the Statutes Relating to Importation of Soils, Plants, Fruits, Vegetables, etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

"Important Notice to Ship Owners, Fruit Importers and Other Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.

"Laws and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

Act 71, Session Laws of 1905: "To Provide for the Protection of Forest Land Within the Territory from Fire." On Brush-Burning Permit Form; 1905.

Act 164, Session Laws of 1907: "To Provide for the Protection of Birds Beneficial to the Forests of the Territory of Hawaii." Unnumbered leaflet; 1907.

Pure Seed Law, Act 107, Session Laws of 1911: "To Regulate the Importation and Sale of Seed Into and Within the Territory of Hawaii." Unnumbered leaflet, 4 pp.; 1911.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to XV; 1904-1918. To be obtained from the Hawaiian Gazette Co., Honolulu, Hawaii. Price, $1.00 a year. (Issued under the auspices of the Board.)

DIVISION OF FORESTRY.

"Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; July, 1911.

"An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.

"Instructions for Propagating Forest, Shade and Ornamental Trees," by David Haughs; Circular No. 2; 11 pp.; June, 1912. Reprinted, May, 1915.

*"Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.

"Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.

"Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.

*"Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.

"Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.

"Na Hoakaka no ke Kanu ana i na Laau Hoomalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.

Rule II: "Concerning the Protection and Administration of Forest Reserves"; unnumbered leaflet; April, 1916.

Rule III: "Concerning Trespassing on the Honolulu Watershed"; unnumbered leaflet; April, 1916.

Rule IV: "Concerning the Protection of Bird, Animal and Vegetable Life on Certain Islands of the Territory; unnumbered leaflet; July, 1917.

"Forestry as Applied in Hawaii," by C. S. Judd. Reprint from "The Hawaiian Forester and Agriculturist," Vol. XV, No. 5; 17 pp.; 4 plates; May, 1918.

Reports

Reports of the Division of Forestry for the years ending December 31, 1905, 1906, 1907, 1908, and biennial periods 1910, 1912, 1914, 1916, and 1918.

Botany

"New and Noteworthy Hawaiian Plants," by Dr. L. Radlkoffer and J. F. Rock. Botanical Bulletin No. 1; 15 pp.; 6 plates; September, 1911.

"List of Hawaiian Names of Plants," by J. F. Rock. Botanical Bulletin No. 2; 20 pp.; June, 1913.

"The Sandalwoods of Hawaii," by J. F. Rock. Botanical Bulletin No. 3; 43 pp.; 13 plates; December, 1916.

"The Ohia Lehua Trees of Hawaii," by J. F. Rock. Botanical Bulletin No. 4; 76 pp.; 31 plates.

PUBLICATIONS FOR DISTRIBUTION—(Continued).

DIVISION OF ENTOMOLOGY

"The Leaf-Hopper of the Sugar Cane," by R. C. L Perkins. Bulletin No. 1; 38 pp.; 1903.

†"A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.

"Report of an Exploration to Africa in Search of the Natural Enemies of Fruit Flies," with Descriptions, Observations and Biological Notes, by F. Silvestri. Bulletin No. 3; 176 pp.; 26 plates; February, 1914.

*"On Some Diseases of Cane Specially Considered in Relation to the Leaf Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.

"A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.

*"The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cuts; 1905.

"Mediterranean Fruit Fly (Ceratitis capitata)," by E. M. Ehrhorn. Circular No. 3; 7 pp.; 2 plates; 1912.

"The Corn Leaf Hopper," by D. T. Fullaway. Bulletin No. 4; 16 pp.; 18 figs.

Reports

Reports of the Division of Entomology for the years ending December 31, 1905, 1906, 1907, 1908, and biennial periods 1910, 1912, 1914, 1916, and 1918.

DIVISION OF PLANT INSPECTION

Rule I: "Concerning the Importation of Fruits, Plants, etc." Unnumbered leaflet; amended June 8, 1918.

Rule III: "Concerning the Importation of Rice." Unnumbered leaflet, amended June 8, 1918.

Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly." Unnumbered leaflet; Nov. 21, 1910.

Rule VIII: "Concerning the Importation of all Banana Fruit, Shoots or Plants." Unnumbered leaflet; Jan. 25, 1911.

Rule IX: "Concerning the Prevention of Distribution of Insect Pests from Oahu to the Other Islands." Unnumbered leaflet; June 28, 1911.

Rule XVII: "Concerning the Control of the Mediterranean Fruit Fly and Other Insect Pests." Repealing Rules X, XI, XIV, XV, and XVI. Unnumbered leaflet; Sept 17, 1912.

Rule XVIII: "Concerning the Control of Fungus Diseases on Pineapples, Island of Kauai." Unnumbered leaflet; May, 1913, amended to include Island of Oahu; June, '914, amended further on Sept. 2, 1916.

Rule XIX: "Concerning the Introduction of Pineapple Plants, etc." Unnumbered leaflet; June 8, 1918.

Reports

Report of the Division of Plant Inspection for the biennial period ended 1918.

DIVISION OF ANIMAL INDUSTRY

*"Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.

*"Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.

*"Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.

"To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.

"Quarantine of Horse Stock from California." Rule 8, 1 p.; 1908.

"Rules and Regulations, Inspection and Testing of Live Stock Intended for Importation." Rules 1 to V and Laws; 11 pp.; unnumbered pamphlet. Effective January 1, 1910; replaces earlier rules.

Rule VI: "Concerning the Quarantine of Dogs for Rabies"; 2 pp.; unnumbered leaflet, 1912.

Rule VII: "Concerning the Shipment of Hogs from the Island of Oahu to any Other Island in the Territory of Hawaii"; unnumbered leaflet; July, 1913.

Rule IX: "Concerning Hog Cholera and Other Diseases of Swine," unnumbered leaflet, August, 1916.

"The Treatment and Prevention of Sore-Head or Chicken Pox, by Means of Vaccination," by V. A. Norgaard. Circular No. 1; 5 pp. February, 1916.

"Regulations Governing the Importation of Live Stock and Other Animals into the Territory of Hawaii." Effective June 8, 1918. Unnumbered circular; 9 pp.; June, 1918.

Reports

Reports of the Division of Animal Industry for the years endings December 31, 1905, 1906, 1907, 1908, and biennial periods 1910, 1912, 1914, 1916, and 1918.

*This Roll can will be sent only to persons interested in the subject.
†Out of print

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REPORT

OF THE

Board of Commissioners of Agriculture and Forestry

OF THE

TERRITORY OF HAWAII

FOR THE

Biennial Period Ended December 31, 1920

HONOLULU, HAWAII
ADVERTISER PUBLISHING CO., LTD.
1921

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Louis Gillin, *Fruit and Plant Inspector, Kahului, Maui.*
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A. R. Rowat, *Deputy Territorial Veterinarian, West Hawaii.*
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Frontispiece.

Photo by Rock.

Water is the chief product of the Hawaiian forest reserve. Wainiha River in the Halelea Forest Reserve, Kauai, above the power intake. Showing excellent condition of

REPORT

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HONOLULU. HAWAII
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Board of Agriculture and Forestry

REPORT OF THE COMMISSIONERS

Honolulu, Hawaii, December 31, 1920.

Hon. C. J. McCarthy,
Governor of Hawaii,
Honolulu, Hawaii.

Sir: The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii has the honor to present herewith its report for the biennial period ended December 31, 1920.

PERSONNEL AND MEETINGS.

During the past two years the personnel of the Board has remained the same as during the previous biennial period, but the office of President was on May 7, 1920, transferred from Mr. A. H. Rice to Capt. A. L. C. Atkinson. The Board has held during the period twenty-six regular and special meetings and two joint meetings with the Governor for public hearings relating to forest reserves.

PUBLICATIONS.

The following publications have been issued during the period under review:

DIVISION OF FORESTRY.

Botanical Bulletin No. 5—"The Arborescent Indigenous Legumes of Hawaii," by J. F. Rock, June 1919.
Botanical Bulletin No. 6—"The Hawaiian Genus Kokia—A Relative of the Cotton," by J. F. Rock, June 1919.

DIVISION OF PLANT INSPECTION.

Rule I., Amended—Concerning the importation of fruits, plants, etc., October 31, 1919.
Rule XII., Amended—Concerning the control of insects and plant diseases in the Territory, May 26, 1920.

Rule XVIII, Amended—Concerning the control of fungus diseases on pineapples, July 18, 1919.
Rule XX.—Concerning the control of insect pests and plant diseases, June 1, 1919. (Repealing Rule XVII.)
Rule XX.—Amended, June 1, 1920.
Rule XXI.—Concerning the control of certain insect and plant pests, February 25, 1920.
Rule XXI.—Amended, May 7, 1920.
Rule XXII.—Concerning the importation into the Territory of potatoes and apples from Pacific Coast ports, May 26, 1920.

DIVISION OF ANIMAL INDUSTRY.

Rule XIV.—To prohibit inter-island shipment of dairy cattle affected with tuberculosis, February 25, 1920.
Order No. 1—Regulations governing the appraisement of tuberculous cattle and expenditures on account of the control and eradication of bovine tuberculosis, July 6, 1920.
Rule VIII., Amended—Concerning vaccination of dogs against rabies, November 6, 1920.

MONTHLY PUBLICATION OF THE BOARD.

Vols. XVI., 1919, and XVII., 1920, "The Hawaiian Forester and Agriculturist."

DIVISION OF FORESTRY.

As in past years, the chief attention of this Division during the period under review has been devoted to forest protection and forest planting and considerable progress has been made toward the conversion of the forest reserves from mere delineations on paper to protected forest areas actually under administration. This has been made possible by the fact that the work of setting aside new forest reserves was practically completed during the previous biennium and with this out of the way greater attention could be given to getting the reserves into better shape, and second, by the employment of a larger ranger force made possible by the generous appropriation of the last legislature, which has resulted in the Division now having eleven forest rangers and an assistant superintendent on duty to patrol against fire and trespass, fence boundaries to prevent stock depredations, rid the reserves of stock and replant denuded areas in the reserves. A turning point in the management of the reserves has been reached in that a good start has been made in actually putting them under proper administration. To further

this work and place it on an efficient basis and not let it stand still or go back three additional rangers are required.

FOREST PROTECTION.

No new reserves were created during the period, but a few changes in existing reserves were made for the purposes of releasing agricultural and park land, defining more appropriate boundaries, and perfecting certain exchanges. The present total area of all lands in the 47 forest reserves on the five main islands, due to these changes and to the correction of previous figures, is 2,188 acres greater than it was two years ago and now amounts to 817,114 acres, of which only 557,344 acres, or 68 per cent, is land belonging to the Territory. The task of inspecting, fencing, planting and otherwise managing more than half a million acres of government forest land located in comparatively inaccessible and mountainous country and scattered over five different islands, the farthermost 360 miles apart, is no small task, but if continued support in the work is given by adequate appropriations the government lands will soon be under such efficient management that the owners of private lands in the reserves will be more inclined to turn such lands over with confidence to this Board for administration. If this is not brought about voluntarily, the title to all lands within forest reserve boundaries should be acquired by purchase or condemnation proceedings, for only by having complete control of all lands in the forest reserves can the Territory protect and administer them with efficiency and make them serve as satisfactory conservers of the water supply. The purchase of these private lands will require large appropriations, but the sooner a start is made toward their acquisition the sooner will the Territory benefit from the result of possessing them and bringing them up to their highest state of usefulness.

Protection against the damage done to the forest by stock has been furthered during the period by the construction of 10.79 miles of new fences on forest reserve boundaries and the repairing of 5.27 miles of existing fences, making a total of 16.06 miles of boundary receiving proper protection. This brings the total reserve fencing work up to 74.17 miles during the past ten years. There are about 17 miles of reserve boundaries in immediate need of new fences and it is hoped that a sufficient appropriation will be made so that this can be accomplished during the coming two years.

Hand in hand with fencing has progressed the removal of stock from the fenced reserves. Animals that are tractable have been driven out by adjacent ranchers and rangers, but stock too wild to drive has been eliminated by shooting. Incomplete re-

turns show that during the past two years 55 wild cattle, 384 wild goats and 435 wild pigs, or a total of 874 destructive wild animals, have been killed on the forest reserves. Tame cattle getting into the reserves now constitutes a greater nuisance than wild cattle and the Board's position should be strengthened by giving it greater authority to remove cattle of all description when once a forest reserve is fenced and notice to that effect given to the public.

In spite of two comparatively dry years there have been only 15 grass and forest fires, most of which were extinguished very soon after they started and only a few of which did damage to the native forest. The Board appreciates the prompt and efficient attention given to these fires by the honorary District Fire Wardens, whose ranks have been kept full by frequent new appointments.

FOREST EXTENSION.

The Division of Forestry has been of special service to the public by publishing a list and description of the poisonous plants of Hawaii and, by importing seed from Siam and raising trees which in time will yield the chaulmoogra oil, hopes to do its small share in the local cure of the leprosy scourge.

The importation of seed of trees which are new to the Territory has continued and the seedlings when ready have been planted out experimentally in various situations to test out their value and ascertain the locations of best growth before being raised in any large quantity.

The Division has now in active operation seven tree nurseries on the four main islands and is in a position to supply the general demand for trees at cost, provided ample notice is given to the nurserymen in charge. The practice of shipping trees in soil from Oahu to the other islands was discontinued in 1919 as a precaution against disseminating insects and the demand for trees on the several islands can now be handled locally. The total tree distribution from the government nurseries during the period amounted to 516,047. This is 135,364 trees less than during the previous two years, but can be accounted for by the strike, which made labor scarce and expensive, and by the two dry years, which made conditions unfavorable for tree planting.

The planting of trees by the Division on forest reserves has almost doubled during the period and amounted to a total of 71,641 trees, which were set out in various situations on 11 different reserves in the attempt to determine the ones best suited to the different localities. In this work 37 different species of trees from various parts of the tropical world, some of them new to the Territory, were used. The chief object of this work is to

ascertain the trees which are best suited in various localities for use in reforesting for water conservation purposes rather than for the production of timber.

Reports, which are not complete, show that slightly over a million trees were planted throughout the Territory during the period by private parties and this Division, a falling off of about half a million when compared with the previous period. Approximately half of these were planted for water conservation purposes and the greater variety used indicates a desire to improve on species used in past years.

MISCELLANEOUS ACTIVITIES.

In addition to forest protection and reforestation the Division has attempted to popularize the practice of forestry by educational exhibits at the county fairs, and by numerous lectures and talks on forest subjects, and by the publication of special articles.

Technical advice and assistance have been rendered the Land Office in prescribing and directing improvement thinnings in algaroba forests, assistance has been given officials of the National Park Service in their task of placing the Hawaii National Park under administration, and in all forest reserve matters close cooperation has been rendered to the Hawaiian Sugar Planters' Association.

RECOMMENDATIONS.

Progress has been made during the period in placing the reserves under actual administration so that they will serve more efficiently the desired purpose of conserving and perpetuating the water supply. It is the desire of this Board to push this work as rapidly as possible and to make even greater progress during the coming period. For this reason it is strongly urged that sufficient appropriations be made so that the present force can be adequately compensated and three new forest rangers be taken on for work which is awaiting attention and so that exposed boundaries in immediate need of protection can be fenced. The Board also goes on record as favoring the acquisition of title to all lands in forest reserves and hopes that a start in this direction can be made as soon as the Territory can afford it. Greater authority by legislative action is also desired to permit more prompt and complete elimination of stock from forest reserves.

The report of the Superintendent of Forestry covers in detail the matters here merely outlined and is followed by a list

of all forest officers, a list of all lands in forest reserves, and by the report of the Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

The work of this Division has been largely along practical lines with the idea of meeting the demand for relief from insect depredations, although a large share of time has been devoted to investigative work and the most pressing problems of insect control have been studied.

The propagation and distribution of beneficial insects, particularly fruit fly, melon fly, corn leaf hopper, horn fly and cabbage butterfly parasites, have been continued during the period with the result that over half a million of these beneficial insects have been liberated throughout the Territory with resulting benefit.

The infestation of the fern weevil at 29 Miles in Olaa, Hawaii, occupied a large share of the Division's attention for several months when the attempt was made with almost complete success of eradicating the weevil from an area of approximately 18 acres in extent by destroying all the amaumau fern on which the weevil feeds and propagates and the tree ferns on which it feeds. A thorough study was made at the same time of the habits and development of this weevil.

The termites, or white ants, which are responsible for a great deal of insidious damage to woodwork, buildings, and wood products in the Territory were also thoroughly studied with the idea of furnishing measures of relief.

On account of unsettled condition abroad which have upset transportation facilities no field work was undertaken until the end of the period, when the Entomologist sailed on December 9, 1920, for Hongkong and India to assist the H. S. P. A. in its quest for insects producing fertile seeds on trees of the genus *Ficus* and to secure further parasites on the melon fly. Cooperative arrangements were also made with the H. S. P. A. for the introduction of parasites of the bean pod borer and for the improvement of horn fly control and steps were taken to employ an entomologist in Australia to investigate the biology of the fern weevil with respect to its natural enemies.

The regular routine of advising residents in regard to the control of agricultural and stock pests, the maintenance of insect collections, and classificatory work have continued during the period.

DIVISION OF PLANT INSPECTION.

This Division has continued the important work of inspect-

ing all shipments of imported vegetable matter in the effort to prevent the introduction of new insect pests and plant diseases. During the biennial period the plant inspectors boarded 1,748 vessels arriving at the ports of Honolulu, Hilo and Kahului and found that 623 carried 579,207 packages of vegetable matter subject to inspection. The bulk of this consisted of fruits and vegetables imported mostly from the mainland of the United States for local consumption. Of this total number of packages, a little over one per cent, or 8,542 packages, were either seized and destroyed by burning because they were infected with dangerous pests or were prohibited from entry by regulation of the Federal Horticultural Board, fumigated as a precaution, or were refused entry on account of infestation. Owing to inspection and fumigation before shipment, it is a satisfaction to report that all of the 533,215 bags of rice and beans arriving at the Territory during the period were found to be free from pests.

During the same period the plant inspectors have examined 89,993 packages of plants, fruits and vegetables on vessels leaving Honolulu for the other islands and refused the shipment of 612 packages because of infestation, prohibited soil, or non-compliance with the regulations pertaining to inter-island shipments.

The rules and regulations pertaining to the importation of plants and vegetable matter from abroad and to shipments from Oahu to the other islands have been either amended or new ones passed so as to strengthen the plant inspection service in the effort to check the spread of insect pests.

To prevent the possible chance introduction of new pests, particularly destructive cane insects, from the mainland in the personal baggage of passengers, the Federal Horticultural Board was on June 10, 1919, petitioned to assist in safeguarding the agricultural industries of this Territory by adopting rules and regulations under the Plant Quarantine Act of August 20, 1912, which would prohibit the introduction of certain articles in the baggage of passengers and would give the local representatives of the Federal Horticultural Board authority to require a declaration of baggage and the power to examine when necessary the personal baggage of passengers arriving in the Territory in order to keep out the prohibited articles. As yet, no final action has been taken on this petition.

The equipment of the Division in Honolulu has been improved by the addition of one fumigation unit, the erection of a plant quarantine greenhouse, and by enclosing the property with a protective fence and gates. It is planned soon to provide Hilo with a fumigation unit, for which funds are available.

The continuation of plant inspection work is of the utmost importance to the agricultural interests of the Territory, especially in view of the increasing number of vessels arriving here from

all parts of the world and an adequate appropriation for its maintenance and increase on an efficient basis is respectfully requested.

DIVISION OF ANIMAL INDUSTRY.

The work of this Division has, in the past years, been devoted mainly to the elimination of contagious diseases of live stock within the Territory and to preventing the introduction of new diseases through importation. Conditions during the two years have in general been favorable to the continued prosperity and advancement of the live stock industry of the Territory and the steady improvement in live stock breeding, especially of dairy cattle, which has increased in scope and volume, is attributed to competition stimulated by the county fairs and to the social welfare work being carried on by the plantations.

Animal diseases during the period have not been of a very serious nature and the veterinarians have directed their energies principally against hemorrhagic septicemia of cattle and swine. The losses from this disease have been kept within reasonable limits owing to the prompt measures of control and vaccination which have been made possible by the revolving fund, established most wisely by the last Legislature, which has enabled the Division to keep on hand large amounts of the various biologics necessary in the effective control and eradication of animal diseases of a contagious nature. For the same reason it has been possible to treat promptly contagious abortion of cattle, which for the first time in this Territory appeared during this period and which is causing more losses to live stock owners than any other one disease.

It is a great satisfaction to report that anthrax is no longer a menace in the Territory because by the efforts of the Division it has been entirely eradicated on Oahu and Maui and is under complete control on Kauai, a record hardly to be duplicated anywhere else in the world.

The testing of cattle for bovine tuberculosis has continued and out of 12,089 head tested in 1,260 dairies during the two years 428 were condemned, slaughtered and compensated for by the Territory. In 1919 the percentage of tuberculosis was considerably higher than in the previous year, due to the wider scope of the work under the new law (Act 204, S. L., 1919), which allowed the testing of herds other than strictly dairy herds, among which were herds long known to be heavily infected with tuberculosis, but in 1920 the percentage of reactors dropped again and to the lowest point it has been since 1914. The percentage of reactors throughout the Territory for the two years was 3.54%, the lowest ever recorded since systematic tuberculosis

eradication work embraced the entire Territory. The average compensation received from the Territory by the owners of condemned tuberculous cattle during the period was $68.41 per head. Owing to the increased market value of dairy cattle, the more liberal limits of indemnification allowed by the new law, and the extension of field work which led to the discovery of new centers of infection the appropriation for this work became exhausted sooner than was anticipated and it became necessary to ask the Special Session in November, 1920, for an additional $7,000.00 to carry on the work up to June 30, 1921. By cooperating in this work with the Bureau of Animal Industry of the U. S. Department of Agriculture additional indemnification has been paid to owners of condemned tuberculous cattle and 48 claims totaling $6,159.20 have been presented to the Federal government for payment, and a large number of them have already been paid. The present Territorial law has, in general, given satisfaction and considerable reduction in the amount of tuberculosis has been accomplished under it. Certain amendments, however, are considered necessary, in the light of experience, to increase its efficiency and to conserve the appropriation as much as possible. A bill embodying the desired changes and the usual appropriation of $20,000.00 for the continuation of the work has been prepared and will be presented to the Legislature.

By the quarantine placed on dogs it has been possible still to prevent the dreaded disease of rabies from gaining an entrance into the Territory. A total of 139 dogs were imported and quarantined during the period, which is a larger number than at any time since 1914. The trials of the quarantine were alleviated in November, 1920, when, by the adoption of a method of vaccination against rabies, it was found possible to reduce the quarantine period from 120 days to approximately 40 days.

In the death on November 15, 1920, of Dr. V. A. Norgaard, who for 15 years held the position of Territorial Veterinarian, the Board lost a most capable officer, who not only did a splendid work for the Territory in suppressing animal diseases found here and in preventing the introduction of new diseases, but also was responsible for great advancement in the principles of live stock breeding throughout the Territory.

The quarantine work of this Division cannot be overestimated because it stands as the guard against the advent of infectious or contagious diseases into the Territory. For this reason every facility should be supplied if we are properly to protect the stock owners of the Territory. The present animal quarantine stations are rapidly becoming inadequate to the demands being made upon them by the increasing number of animals arriving in the Territory and adequate appropriations are required

to place them in efficient condition, a new station of permanent construction being required for Honolulu in a new location.

CONCLUSION.

In concluding this report, the Commissioners desire to emphasize the valuable work which has been performed for the benefit of the Territory as a whole by its four Divisions, the reports of which follow herewith in detail, and to assure you that it is their wish to advance the work as far as possible. For this reason it is confidently hoped that the Board and its four Divisions will receive adequate support, both financially and otherwise, for the continuation on an even broader basis of these important lines of work.

Respectfully submitted,

A. L. C. ATKINSON, President;
A. H. RICE.
W. M. GIFFARD.
J. M. DOWSETT.
H. M. von HOLT.

Commissioners.

REPORT OF EXPENDITURES.
BOARD OF AGRICULTURE AND FORESTRY.

For the Period from January 1, 1919, to December 31, 1920.

Appropriations by Legislature of 1917.

GENERAL FUND.

Balance on hand, December 31, 1918			$66,253.45
Expended January 1, 1919, to June 30, 1919.			
Board of Administration:			
Salary, executive officer and superintendent of forestry	$2,100.00		
Salaries and wages, employes	2,630.00		
Expenses	1,427.73		
		$ 6,157.73	
Division of Forestry:			
Salary, forest nurseryman	$1,110.00		
Salaries, rangers and nursery agent, Hilo, and botanist	2,089.03		
Wages of laborers	6,542.68		
Expenses	7,928.95		
		17,670.66	
Division of Entomology:			
Salary, entomologist	$1,500.00		
Salaries, assistants	862.00		
Expenses	2,334.91		
		4,696.91	
Research Work, introducing parasite insects		.....	
Division of Plant Inspection:			
Salary, chief plant inspector	$1,500.00		
Salaries, inspectors	2,823.87		
Expenses	1,905.15		
		6,229.02	
Division of Animal Industry:			
Salary, territorial veterinarian	$1,500.00		
Salary, assistant veterinarian	1,200.00		
Salary, livestock inspector	780.00		
Salaries, deputy veterinarians and caretakers, quarantine stations	1,900.00		
Expenses	1,291.52		
		6,671.52	
Glenwood Experimental Station:			
Salaries and wages	$ 900.00		
Expenses and assistants	493.37		
Traveling expenses	296.24		
		1,689.61	
Total expended			43,115.45
Balance June 30, 1919			$23,138.00

SPECIAL FUNDS.

Control, Suppression and Eradication of Anthrax (Act 162, S. L. H., 1917, April 27, 1917), $25,000.00.			
Balance unexpended December 31, 1918	$ .46		$ .46

Control, Suppression and Eradication of Anthrax (Act 74, S. L. H., 1919, April 14, 1919), Salary for March, April, May and June, 1919, for veterinarian in charge of anthrax situation, Kauai	$ 1,000.00	
Expended	1,000.00	
To reimburse the county of Kauai for expenditures incurred during the year 1918 in the anthrax epidemic (Act 81, S. L. H., 1919, April 14, 1919)	$ 3,584.00	
Expended	3,584.00	
To Prevent, Suppress and Eradicate Bovine Tuberculosis (Act 121, S. L. H., 1917, April 23, 1917, $20,000). Balance on hand December 31, 1918	$ 4,027.62	
Appropriated by Legislature, 1919 (Act 204, S. L. H., 1919, April 30, 1919)	20,000.00	
	$24,027.62	
Expended	4,105.03	
Balance unexpended June 30, 1919		$19,922.59
Animal Division Revolving Fund, (Act 85, S. L. H., 1919, April 15, 1919)	$ 5,000.00	
Expended May and June, 1919	750.80	
	$ 4,249.20	
Receipts, interest	14.67	
Balance unexpended June 30, 1919		$ 4,263.87
Preservation, Extension Forestry and Forest Reserves: Balance on hand December 31, 1918	$ 4,211.29	
Expended to June 30, 1919	1,053.03	
	$ 3,158.26	
Receipts	564.33	
Balance unexpended June 30, 1919		$ 3,722.59

Appropriations by Legislature of 1919.

GENERAL FUND.

Expended July 1, 1919 to December 31, 1920.

Board of Administration: Salary, executive officer and superintendent of forestry	$ 9,600.00	
Expended	7,200.00	
Unexpended balance December 31, 1920		$ 2,400.00
Salaries and wages, employes	$11,280.00	
Expended	8,290.55	
Unexpended balance December 31, 1920		$ 2,989.45

Expenses	$ 7,000.00	
Expended	5,528.13	
Unexpended balance December 31, 1920 ..		$ 1,471.87
Division of Forestry:		
Salary, assistant superintendent of forestry ..	$ 4,800.00	
Expended from June 22 to Dec. 31, 1920	1,260.00	
Unexpended balance December 31, 1920 ..		$ 3,540.00
Salary, forest nurseryman	$ 4,800.00	
Expended	3,600.00	
Unexpended balance December 31, 1920 ..		$ 1,200.00
Salaries, rangers and nursery agent, Hilo, and botanist	$11,040.00	
Expended	7,988.55	
Unexpended balance December 31, 1920 ..		$ 3,051.45
Wages of laborers	$28,944.00	
Expended	20,415.98	
Unexpended balance December 31, 1920 ..		$ 8,528.02
Extended Service, Forestry	$15,000.00	
Expended 15 mos., Oct., 1919, to December 31, 1920	3,523.66	
Unexpended balance December 31, 1920 ..		$11,476.34
Expenses	$21,000.00	
Expended	13,810.93	
Unexpended balance December 31, 1920 ..		$ 7,189.07
Division of Entomology:		
Salary, entomologist	$ 7,200.00	
Expended	5,400.00	
Unexpended balance December 31, 1920 ..		$ 1,800.00
Salaries, assistants	$ 3,960.00	
Expended	2,925.00	
Unexpended balance December 31, 1920 ..		$ 1,035.00
Expenses	$ 4,000.00	
Expended	2,704.63	
Unexpended balance December 31, 1920 ..		$ 1,295.37
Research Work, introducing parasite insects...	$ 4,000.00	
Expended during December, 1920	465.50	
Unexpended balance December 31, 1920 ..		$ 3,434.50
Division of Plant Inspection:		
Salary, chief plant inspector	$ 7,200.00	
Expended	5,400.00	
Unexpended balance December 31, 1920 ..		$ 1,800.00

Salaries, inspectors	$22,000.00	
Expended	11,057.23	
Unexpended balance December 31, 1920 ..		$10,942.77
Expenses	$ 4,000.00	
Expended	3,059.22	
Unexpended balance December 31, 1920 ..		$ 940.78
Division of Animal Industry:		
Salary, territorial veterinarian	$ 7,200.00	
Expended	5,250.00	
Unexpended balance December 31, 1920 ..		$ 1,950.00
Salary, assistant veterinarian	$ 6,000.00	
Expended	4,346.77	
Unexpended balance December 31, 1920 ..		$ 1,653.23
Salary, livestock inspector	$ 3,720.00	
Expended	2,790.00	
Unexpended balance December 31, 1920 ..		$ 930.00
Salaries, deputy veterinarians and caretakers, quarantine stations	$16,800.00	
Expended	12,230.00	
Unexpended balance December 31, 1920 ..		$ 4,570.00
Expenses	$ 9,500.00	
Expended	8,641.23	
Unexpended balance December 31, 1920 ..		$ 858.77
Extension of quarters	$ 2,000.00	
Expended	1,924.94	
Unexpended balance December 31, 1920 ..		$ 75.06

SPECIAL FUNDS.

Animal Division Revolving Fund (Act 85, S. L. H., 1919, April 15, 1919, $5,000).		
Balance on hand July 1, 1919	$ 4,263.87	
Expended	3,450.22	
	$ 813.65	
Receipts, interest and deposits	2,211.43	
Unexpended balance December 31, 1920 ..		$ 3,025.08
To Prevent, Suppress and Eradicate Bovine Tuberculosis.		
Balance on hand July 1, 1919	$19,922.59	
Additional amount appropriated (Act 28, Special Session, 1920, November 24, 1920)	7,000.00	
	$26,922.59	
Expended	22,495.62	
Unexpended balance December 31, 1920 ..		$ 4,426.97

Preservation, Extension Forestry and Forest Reserves.		
Balance on hand July 1, 1919	$ 3,722.59	
Receipts—deposits	1,352.78	
	$ 5,075.37	
Expended to March 30, 1920	4,657.29	
Unexpended balance December 31, 1920		$ 418.08
Governor's Contingent Fund, allotted to combat and control fern weevil outbreak, March 9, 1920	$ 2,500.00	
Expended April to September 30, 1920	2,062.88	
Unexpended balance December 31, 1920		$ 437.12

DETAILS OF EXPENDITURES.

	1919 Jan. 1 to June 30, 1919	1919 6 mos. July 1 to Dec. 31, 1919	1920 12 mos. Jan. 1 to Dec. 31, 1920	18 mos. July 1, 1919 to Dec. 31, 1920	Total 24 months, Jan. 1, 1919, to Dec. 31, 1920
Board of Administration:					
Salaries and Wages:					
Executive Officer and Superintendent of Forestry ..	$2,100.00	$ 2,400.00	$ 4,800.00	$ 7,200.00	$ 9,300.00
Salaries and Wages, Employes	2,630.00	2,730.00	5,560.55	8,290.55	10,920.55
	$4,730.00	$ 5,130.00	$10,360.55	$15,490.55	$20,220.55
Expenses:					
Routine	$ 130.88	$ 212.73	$ 349.97	$ 562.70	$ 693.58
Supplies	670.43	197.79	598.57	796.36	1,466.79
Transportation	75.40	42.00	450.20	492.20	567.60
Publications	382.90	532.37	800.96	1,333.33	1,716.23
Maintenance	168.12	152.00	2,191.54	2,343.54	2,511.66
	$1,427.73	$ 1,236.89	$ 4,391.24	$ 5,528.13	$ 6,955.86
Division of Forestry:					
Salaries and Wages:					
Assistant Superintendent of Forestry	$.....	$.....	$ 1,260.00	$ 1,260.00	$ 1,260.00
Forest Nurseryman	1,110.00	1,200.00	2,400.00	3,600.00	4,710.00
Rangers and Nursery Agents	2,089.03	2,760.00	5,228.55	7,988.55	10,077.58
Wages of Laborers	6,542.68	6,837.50	13,578.48	20,415.98	26,958.66
	$9,741.71	$10,797.50	$22,467.03	$33,264.53	$43,006.24
Extended Service:					
Salaries and Wages:					
Rangers	$.....	$ 399.45	$ 3,124.21	$ 3,523.66	$ 3,523.66
Expenses:					
Routine	$.....	$ 39.52	$ 78.48	$ 118.00	$ 118.00
Supplies	863.34	152.42	448.97	601.39	1,464.73
Transportation	1,226.37	1,077.95	4,629.38	5,707.33	6,933.70
Publications	1,310.50	20.94	187.69	208.63	1,519.13
Maintenance	50.72	16.25	1,174.91	1,191.16	1,241.88
Nurseries	1,304.96	339.79	1,823.38	2,163.17	3,468.13
Planting	540.03	520.99	456.22	977.21	1,517.24
Fencing	2,633 02	1,058.93	995.36	2,054.29	4,687.31
Forest Fires	.....	.....	789.75	789.75	789.75
	$7,928.94	$ 3,226.79	$10,584.14	$13,810.93	$21,739.87

Division of Entomology:					
Salaries and Wages:					
Entomologist	$1,500.00	$ 1,800.00	$ 3,600.00	$ 5,400.00	$ 6,900.00
Assistants	862.00	945.00	1,980.00	2,925.00	3,787.00
	$2,362.00	$ 2,745.00	$ 5,580.00	$ 8,325.00	$10,687.00
Expenses:					
Routine	$ 46.63	$ 41.15	$ 75.30	$ 116.45	$ 163.08
Supplies	581.07	333.63	248.81	582.44	1,163.51
Transportation	84.49	294.28	1,436.32	1,730.60	1,815.09
Publications	1,210.17	193.66	51.43	245.09	1,455.26
Maintenance	412.55	.....	30.05	30.05	442.60
	$2,334.91	$ 862.72	$ 1,841.91	$ 2,704.63	$ 5,039.54
Division of Plant Inspection:					
Salaries and Wages:					
Chief Plant Inspector	$1,500.00	$ 1,800.00	$ 3,600.00	$ 5,400.00	$ 6,900.00
Inspectors	2,823.87	3,236.44	7,820.79	11,057.23	13,881.10
	$4,323.87	$ 5,036.44	$11,420.79	$16.457.23	$20,781.10
Expenses:					
Routine	$ 72.67	$ 74.57	$ 214.20	$ 288.77	$ 361.44
Supplies	652.18	338.54	598.52	937.06	1,589.24
Transportation	258.23	257.81	753.01	1,010.82	1,269.05
Publications	279.42	63.50	347.75	411.25	690.67
Maintenance	642.65	121.42	289.90	411.32	1,053.97
	$1,905.15	$ 855.84	$ 2,203.38	$ 3,059.22	$ 4,964.37
Division of Animal Industry:					
Salaries and Wages:					
Territorial Veterinarian	$1,500.00	$ 1,800.00	$ 3,450.00	$ 5,250.00	$ 6,750.00
Assistant Veterinarian	1,200.00	1,500.00	2,846.77	4,346.77	5,546.77
Livestock Inspector	780.00	930.00	1,860.00	2,790.00	3,570.00
Deputy Veterinarians and Caretakers, Quarantine Stations	1,900.00	3,710.00	8,520.00	12,230.00	14,130.00
	$5,380.00	$ 7,940.00	$16,676.77	$24,616.77	$29,996.77
Expenses:					
Routine	$ 145.71	$ 112.46	$ 310.29	$ 422.75	$ 568.46
Supplies	100.42	87.52	611.59	699.11	799.53
Transportation	535.79	431.17	4,013.69	4,444.86	4,980.65
Publications	347.95	83.73	332.47	416.20	764.15
Maintenance	.....	4.00	877.08	881.08	881.08
Quarantine Station	161.65	1,287.94	489.29	1,777.23	1,938.88
	$1,291.52	$ 2,006.82	$ 6,634.41	$ 8,641.23	$ 9,932.75

Division of Forestry

REPORT OF THE SUPERINTENDENT OF FORESTRY

Honolulu, Hawaii, December 31, 1920.

The Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1919 and 1920.

INTRODUCTION.

As in past years, the work of this Division has naturally been along two main lines—forest protection and forest extension —and the details of work accomplished during the past two years in these two directions as well as in subsidiary activities are set forth in the following pages.

The chief value of the native Hawaiian forest, that of exerting a very beneficial influence on the run-off by preventing excessive floods and assuring a steady supply of water in springs, streams and artesian basins, has been explained many times in these and in other reports and is fairly well understood by all in this Territory, especially by those who are engaged in agricultural pursuits and are dependent on a sure and steady water supply. This principle, therefore, does not require further elucidation at this time.

The ways and means of maintaining and rehabilitating the native forest so that it will perform this function to its highest degree involve the problems which the Division of Forestry is working on and which are dealt with in this report.

Except for a few areas of private lands within forest reserve boundaries, which have, by provision of law, been turned over to the control of this Board for a term of years, the activities of this Division in the line of forest protection have necessarily and legally been confined entirely to lands within the reserves which are owned by the Territory. As a result of the peculiar system of Hawaiian land surveys, private lands are indiscriminately interspersed with government lands in the re-

serves. When it comes to the administration and protection of a reserve the work of this Division is thereby hampered and the result is unsatisfactory unless the owner of the private land cooperates to the fullest extent in the protection of his forest. An example of this failure to cooperate in forest protection occurs on Hawaii, where a large cattle ranch utilizes, as a pasture, a section of forest land within the recommended boundaries of the largest forest reserve on the island. Such a situation requires the construction and maintenance of fences which, in the mind of a forester, are entirely uncalled for and results in the destruction of the forest on the private land as the inevitable result of grazing.

Eventually, and the sooner the better, the title to all privately owned lands within the finally established boundaries of forest reserves should be acquired by the Territory so that situations, like the above-cited example, will be impossible and so that each reserve can be treated as a unit. In this manner only can the reserves be protected and administration facilitated with the most satisfactory results. To accomplish this, large appropriations will have to be made for acquiring the lands, and provision will have to be made by the Territory for an additional force of efficient men to manage them.

The Hawaiian Sugar Planters' Association is representative of the progressive cooperation which is possible in the care of the native forest. The forestry division of that association has made a good start in the proper direction by giving a section of the Kohala Mt. Forest Reserve on Hawaii better protection against the inroads of stock and by the establishment of two tree nurseries which are supplying trees for the reforestation of the open private lands in this reserve. The Division of Forestry is working in close cooperation with that association on this project. Similar cooperative work has already begun in connection with the Hilo Forest Reserve and the water producing reserves on Oahu.

FOREST PROBLEMS.

In the administration of the Hawaiian forest reserves as protection forests the immediate problems of the greatest magnitude which confront this Division consist of the adequate protection of the native forest against the inroads made by fire, man, invasive vegetation and stock and of the reforesting of denuded areas.

Under the first group, the fire menace fortunately is comparatively small, owing to the damp condition of the forest, which is maintained naturally except during unusually dry seasons. Intentional damage by man, such as timber trespass, is

Plate I.

Photo by Rock.

Moss-covered ohia lehua tree at Kilohana, Na Pali-Kona Forest Reserve, Kauai. Elevation 4,023 feet. Showing combination of trees and undergrowth ideal for the conservation of water.

practically negligible and is soon stopped because of the ease of apprehension. The carrying of seeds of undesirable and invasive vegetation, such as Hilo grass, into the mountains unconsciously by trampers, who are thus responsible for the insidious spread of such plants into the native forest with dire results, constitutes, however, a far more serious menace, as will be seen later on in this report.

The protection of the forest against inroads by stock is and will remain for some time the chief work of the Division. This is accomplished, first, by the construction of new and the maintenance of existing fences on exposed boundaries to keep out stock, and, second, by the riddance of stock within fenced reserves. The susceptibility of the native forest, with its combination of shallow-rooted trees, undergrowth of ferns and vines, and ground cover of mosses and small plants (an ideal combination for preventing excessive run-off and converting surface drainage by percolation into sub-drainage) to damage by stock is so well known to all that it is unnecessary to repeat that one can not have a perfect native forest and stock on the same land. Grazing in the native forest simply starts the damage which is followed up by invasions of fast growing grasses, fungus and insect damage, and other attendant ills. The native forest, however, even when partially damaged in this manner, will recuperate to a large extent when given protection and it is well worth while to fence and keep out stock if there is a nucleus of native forest on the land. Nature works more rapidly than man by the process of natural tree reproduction and far more can be accomplished under most circumstances by protecting and giving the native forest a chance to rehabilitate itself than by the laborious and expensive process of artificial reforestation represented by tree planting.

Where land areas have been so completely deprived of their forest cover that natural reproduction can not be expected within a reasonable time the process of tree planting by human effort must be employed. This is especially true where forest denudation has been succeeded by the invasion of a fast growing ground cover, such as Hilo grass, which would greatly hinder the germination of naturally sown tree seeds. In this problem is involved the question of introducing, planting, and finally selecting (a long process) new species of vigorously growing trees which will produce a suitable forest cover, in combination with undergrowth, for water conservation and which will give quicker and better results than the shallow-rooted and susceptible indigenous species. The elimination of undesirable ground cover such as Hilo grass by shading out or by other means also comes in here for a share of attention. Experiments on this problem will be undertaken by this Division during 1921.

What the Division has done during the past two years toward the solution of these problems is shown in this report.

ADMINISTRATIVE FIELD FORCE.

At the beginning of the two-year period the Division had only seven forest rangers to look after the 557,344 acres of government forest land under its control, or one ranger for every 80,000 acres. At the end of the period eleven rangers were on the roster, or at the rate of one ranger for every 50,000 acres. The changes in the ranger force were as follows:

Ranger W. V. Hardy served on Kauai until June, 1920, when he resigned because of his departure from the Territory. The position has been left vacant until a qualified successor can be secured and an appropriation has been requested for such a man for the coming biennial period. Ranger Hosea K. Lovell is the other ranger on the windward side of Kauai.

On Oahu, Ranger Daniel Kapahu succeeded John Pililaau on February 1, 1919, as ranger for the Waianae District and on May 24, 1920, J. P. Pico was appointed honorary forest ranger for the Waianae-kai Reserve. On December 13, 1920, V. L. Ellis was appointed Forest Ranger at Large and will be assigned to duty on the other islands where needed as well as on Oahu. The other two rangers for this island are David Kapihi and E. H. Hipple.

On Maui, Ranger James Lindsay devotes almost his entire time to the Division's forest nursery at Haiku and another competent man for general ranger work is much needed for this island.

On Hawaii, Antone P. Aguiar was on April 14, 1919, appointed Forest Ranger to protect the forest on the Panaewa Reserve on the Volcano Road; on October 6, 1919, Charles E. Stone was appointed forest ranger for the reserves in Kau and South Kona; and on June 1, 1920, Harry L. Denison was appointed forest ranger to protect and administer the Kohala Mt. and Hamakua) Pali Forest Reserves in cooperation with the Hawaii Sugar Planters' Association. The fourth ranger on Hawaii is A. J. W. Mackenzie. Another efficient ranger is much needed for the Hilo Reserve and unless an appropriation for this position is secured the plans made for the proper and very necessary protection of this reserve will unfortunately have to be abandoned.

During the early stages of changing the reserves from mere paper reserves to actual forest lands under administration it was necessary with the meager appropriations to limit the choice of rangers to local residents who had homes in the immediate vicinity of the reserves in their charge and who could devote a

Photo by Rock.

Alakai Swamp, Na Pali-Kona Forest Reserve, Kauai. The source of many of the streams on the Garden Island.

part of their time to the general care of the land. The law requiring that only citizens can be employed also limited the choice of men to elderly Hawaiians or old white men because vigorous young citizens could not be secured for the salary offered. This condition obtains today to some extent, although the recent appointment of the Forest Ranger at Large, an energetic young man who devotes all of his time to the work is a step toward the end at which this Division is aiming, viz., the employment as forest rangers of energetic young citizens, preferably those who have had some technical forest training, who will devote all their time to the work and who will be furnished quarters at or near the forests where their work lies. The sooner adequate appropriations are made to carry this plan completely into effect the sooner will conditions on the forest reserves be whipped into proper shape.

A distinct addition to the staff was the appointment of Mr. Charles J. Kraebel, a graduate of the Michigan Forest School, veteran of the great war, and endowed with many years' experience with the U. S. Forest Service on the Pacific Coast. Mr. Kraebel began his duties in the Territory on June 23, 1920, and already has such a good grasp on the forest situation that much additional work, which had necessarily been delayed, has been accomplished by his personal efforts.

FOREST PROTECTION.

POLICY.

During the biennial period the Division established two policies on doubtful points which deserve mention here.

The first of these, established in August, 1919, is to treat the government lands in forest reserves throughout the Territory so that they will serve as sanctuaries for wild game of the feathered tribe where pheasants, chickens and other birds may breed and multiply unmolested. No permits to hunt birds on government lands in forest reserves have been issued, therefore, since the establishment of this policy and all such hunting is held as trespass. The only exception to this rule was made in October of the same year, when it was pointed out that the only place on Maui where the ordinary sportsman could hunt wild pheasants was in the Kula Forest Reserve and that an injustice was being done by the rule. Permits have been therefore issued for hunting pheasants on this reserve only during the open season. It is felt that the beneficial effects of this general policy will soon be felt by the natural increase of wild birds in the foothill country of the forest reserves.

The second was the stand taken in December, 1920, that,

no matter how desirable it was to foster the new industry of making starch from tree ferns, no tree ferns would be allowed to be cut for this purpose on any government lands and that all permission for such a privilege would consistently be refused. This attitude was taken on well founded grounds because from careful observation it is apparent that no matter what care may be taken the removal of tree ferns would not only upset the delicate balance of nature found in the native forest, but would result in other attendant ills such as the opening up of the forest floor to the sunlight, the detrimental drying out of the shallow-rooted system of the trees, and the introduction of deleterious foreign grasses and weeds of an invasive nature. The native forest must be regarded as a valuable asset in itself when left alone and can not survive if it is to be exploited for starch or stock grazing.

FOREST RESERVE CHANGES.

No new reserves were proclaimed during the period, this work having already been accomplished in the main. Several changes were, however, made in existing reserves for purposes of releasing agricultural and park land, defining more appropriate boundaries, and perfecting certain exchanges.

On April 2, 1919, the Governor signed a proclamation withdrawing 415 acres of land along the edge of Waimea Canyon from the Puu Ka Pele Forest Reserve, Kauai, and subsequently issued an executive order turning the land over to the County of Kauai as a public recreational and camping park. The withdrawal of this area from the reserve for this purpose was approved by the Board on March 10, 1919, on application from the Kauai Chamber of Commerce, the Kauai Planters' Association, and the Kauai County Board of Supervisors. The area is situated on the brink of the famous and spectacular Waimea Canyon at an elevation of 3,500 feet and is accessible by automobile over a road which is soon to be improved. Water has been piped to the land, which will be opened to campers during the coming summer season.

The only other changes, five in number, were consummated by proclamations signed by Governor McCarthy on June 21, 1920. These were as follows:

1. The addition of 30,000 square feet of land along the Volcano Road, acquired by exchange from F. G. Snow, to Sec. C of the Olaa Forest Park Reserve, Hawaii.

2. The withdrawal of 83.10 acres of agricultural land from the Olaa Forest Reserve, Hawaii, near 24 Miles on the Volcano Road.

3. The withdrawal of 3,230 square feet of land on Tantalus

Plate III.

Photo by Rock.

The steep cliffs along the northwest coast of Kauai. Showing conditions in the Na Pali-Kona Forest Reserve. Native lauhala (Pandanus) trees growing almost to the water's edge.

Heights within the Honolulu Watershed Forest Reserve, Oahu, desired by the Land Commissioner for exchange purposes.

4. A modification of the lower boundary of the Lihue-Koloa Forest Reserve, Kauai, to release agricultural land and conform to an established fence line across the lands of Hanamaulu and Wailua, making a net reduction in area of 658 acres.

5. A modification of the boundaries of the Kealia Reserve, Kauai, to release agricultural land and make certain boundary lines more definite, making a net reduction in area of 885 acres.

With these changes, the present total area in the 47 forest reserves throughout the Territory now amounts to 817,114 acres, which is about 20 per cent of the total land area of all the islands. As will be seen in the following table, only 68 per cent of the land in forest reserves, or 557,344 acres, belongs to the Territory.

SUMMARY OF FOREST RESERVE AREAS.

Island	Number of Reserves	Private Acres	Government Acres	Total Acres	Per Cent
Kauai	8	66,574	80,096	146,670	18%
Oahu	15	33,888	34,045	67,933	8%
Molokai	1	31,406	13,268	44,674	6%
Maui	7	46,148	74,980	121,128	15%
Hawaii	16	81,754	354,955	436,709	53%
Totals	47	259,770	557,344	817,114	100%
Per Cent		32%	68%	100%	

The problem of inspecting, fencing, planting, and otherwise managing more than half a million acres of government forest land located in mountainous country and scattered over five different islands, the furthermost 360 miles apart, is not as simple as if the areas were located in one compact accessible body.

Although the main bulk of forest reserve land has been set aside, there remain a few additional areas to be created. One of these is the forest land along the cliffs of Waimanalo and Kailua on Oahu, which will soon be reported on. It is planned also to add more forest land to the Hilo Reserve on Hawaii as soon as the survey can be made. It is most desirable also to secure and add to the Kohala Mt. Reserve on Hawaii an area of over 4,000 acres of land on an important watershed which is being denuded of its forest by grazing.

The following table gives the acreage of each reserve and at the end of this report there is set forth in detail the name and acreage of each land in each forest reserve in the Territory.

LIST OF FOREST RESERVES, TERRITORY OF HAWAII.

January 1, 1921.

Name of Reserve	No.	Private Land, Acres	Government Land, Acres	Total Area Recommended to be Reserved, Acres	Date of Proclamation
ISLAND OF KAUAI.					
Halelea	5	26,510	10,990	37,500	Aug. 24, 1914
Kealia	6	2,470	6,580	9,050	Mar. 9, 1906
Na Pali-Kona	13	19,890	40,650	60,540	June 12, 1907
Lihue-Koloa	19	15,661	12,941	28,602	June 5, 1909
Moloaa	20	2,043	3,578	5,621	June 5, 1909
Papapaholahola	41	.....	54	54	June 19, 1918
Nonou	44	.....	818	818	Dec. 31, 1918
Puu Ka Pele	45	.....	4,485	4,485	Dec. 31, 1918
		66,574	80,096	146,670	
ISLAND OF OAHU.					
Kaipapau	1	.....	913	913	Nov. 10, 1904
Ewa	7	23,399	5,151	28,550	Mar. 9, 1906
Waianae-kai	10	107	3,546	3,653	Sept. 7, 1906
Lualualei	11	.....	3,743	3,743	Nov. 30, 1906
Pupukea	21	.....	864	864	May 10, 1910
Nanakuli	28	.....	1,010	1,010	June 4, 1913
Makua-Keaau	29	340	4,480	4,820	June 4, 1913
Kuaokala	30	.....	434	434	June 4, 1913
Honolulu Watershed	34	1,952	4,998	6,950	Oct. 13, 1913
Kuliouou	35	.....	214	214	Feb. 13, 1913
Manoa Ranger Station	38	.....	15	15	May 9, 1916
Round Top	39	.....	115	115	Aug. 10, 1916
Waiahole	42	40	1,129	1,169	June 19, 1918
Mokuleia	46	.....	6,290	6,290	Dec. 31, 1918
Hauula	47	8,050	1,143	9,193	Dec. 31, 1918
		33,888	34,045	67,933	

ISLAND OF MOLOKAI.					
Molokai	26	31,406	13,268	44,674	Sept. 11, 1912
ISLAND OF MAUI.					
Koolau	4	12,739	30,230	42,969	Aug. 24, 1905
Hana	12	1,058	13,767	14,825	Nov. 30, 1906
West Maui	14	25,335	19,147	44,482	Apr. 21, 1908
Makawao	15	.....	2,093	2,093	Apr. 21, 1908
Waihou Spring	18	10	74	84	June 5, 1909
Kula	27	1,006	5,069	6,075	Sept. 11, 1912
Kipahulu	36	6,000	4,600	10,600	Aug. 20, 1914
		46,148	74,980	121,128	
ISLAND OF HAWAII.					
Hamakua Pali	2	2,607	16,333	18,940	Dec. 23, 1904
Hilo	3	49,777	60,223	110,000	July 24, 1905
Honuaula	8	.....	665	665	Apr. 4, 1906
Kau	9	6,255	60,839	67,094	Aug. 2, 1906
Waiaha Spring	16	.....	193	193	Apr. 21, 1908
Mauna Kea	17	.....	66,600	66,600	June 5, 1909
Hauola	22	.....	7	7	June 13, 1910
South Kona	24	7,692	29,260	36,952	May 17, 1911
Puna	25	.....	19,850	19,850	June 29, 1911
Kohala Mt.	31	15,423	14,204	29,627	Oct. 13, 1913
Upper Waiakea	32	.....	55,000	55,000	Oct. 13, 1913
Upper Olaa	33	.....	9,280	9,280	Oct. 13, 1913
Olaa Forest Park	37	.....	532	532	Aug. 20, 1914
Panaewa	40	.....	1,750	1,750	Apr. 11, 1917
Keauohana	43	.....	272	272	June 19, 1918
Olaa	48	.....	19,947	19,947	Dec. 31, 1918
		81,754	354,955	436,709	
TOTAL ALL ISLANDS.....		259,770	557,344	817,114	
		32%	68%	100%	

RULES AND REGULATIONS.

The present rules and regulations for the protection and administration of government lands in the forest reserves have worked out well and have proven so satisfactory that it has not been necessary to make any changes in them during the period under review.

In March, 1919, two Orientals were arrested in Wood Valley, Kau, Hawaii, for violating paragraph (b) of Rule II by allowing livestock to graze in the Kau Forest Reserve. Each was given a suspended sentence of 13 months by the district magistrate. In October of the same year two Orientals were arrested for cutting grass within the area around the reservoirs in Nuuanu Valley on Oahu on which trespass is prohibited by Rule III. They pleaded guilty in the Honolulu police court and were given suspended sentences of 13 months.

PROPOSED RULE V.

The alarming rate at which Hilo grass is spreading along cut trails in the mountains of Oahu, due to the seed being carried into the native forest on the trousers and shoes of trampers, and the trepidation with which I view the disastrous results to the undergrowth and eventually to the native trees, more particularly on the steep watershed areas immediately back of Honolulu, led me early in February, 1920, to prepare Rule V, which contemplates the exclusion of the public from the native forest on the steep mountain slopes at the head of Palolo and Manoa Valleys.

The retention of the native forest growth and its preservation in the healthiest possible condition on this area is of the utmost importance for the perpetuation of the streams and springs arising thereon and contributing to the water supply of Honolulu, and I consider it of the utmost importance to give this forest the greatest protection possible. It will be far cheaper to stop the damage now rather than to try to reforest the area at prohibitive cost after the growth has been destroyed by the further spread of this invasive grass.

The excluding of persons from the area, thereby stopping the further importation of Hilo grass seed, is the necessary first step toward eliminating the grass from the trail and adjacent areas to which it has spread. Unless trampers are kept off the trail and the entire area it will be useless even to start this control work.

This proposed rule has received the hearty endorsement of the Hawaiian Sugar Planters' Association and, that it might be discussed before adoption, a public hearing was on June 9, 1920,

Plate IV.

Photo by Kraebel.

Water and dense forest growth along Kalakaoo stream above Akaka Falls, Kaiwiki, in the Hilo Forest Reserve, Hawaii.

held on the subject. This hearing was well attended and the grave danger of the ruination of the native forest by the spread of Hilo grass brought in, in seed form, and scattered along the trail by the feet of trampers was pointed out by forest experts. Opposed to this were the arguments that the Olympus-Konahuanui trail should be kept open as a tourist asset and for the use of local recreationists.

Rule V was presented to you for consideration in a special report dated April 19, 1920, and its adoption was again strongly recommended to you in my routine report for June, 1920. It is at this time called again to your attention, and I respectfully urge its adoption so that the control work can be initiated before the task becomes too herculean.

FOREST FENCING.

The task of protecting forest boundaries exposed to stock by the construction of fences has progressed almost as rapidly during the period as in the previous two years. Since in most cases a personal examination of the proper line to be fenced must first be made and detailed arrangements perfected for hauling material and supplying labor, and owing to the widely-scattered and comparatively inaccessible locations of fencing projects and the necessity often of determining on the right line by a survey, the fencing problem is not the simple one that might be imagined in which rapid progress can be made. The necessity of turning my attention early in 1920 to the insect control work in Olaa, Hawaii, and later on in the year an enforced leave of absence due to ill health interfered greatly with the fencing program that I had laid out. In spite of this, the Division has on its own initiative, and in cooperation with private owners and the Land Office, effected the construction of 10.79 miles of new fencing and the repairing of 5.27 miles of existing fences on exposed forest reserve boundaries during the past two years, making a total of 16.06 miles of boundary receiving proper protection, as shown in the tables which follow. This brings the fencing work up to 74.17 miles during the past 10 years.

There are about 17 miles of reserve boundaries in immediate need of fencing, and it is earnestly hoped that the Legislature will appropriate sufficient funds to accomplish this most important work during the coming biennial period.

FENCES CONSTRUCTED, 1919-1920.

Date Completed.	Island.	Reserve.	Location.	Length (Miles).
Feb., 1919	Hawaii	Kau	Kiolakaa	1.00
Mar., 1919	Oahu	Makua-Keaau	Keaau	.84
Mar., 1919	Oahu	Makua-Keaau	Makua	1.07
June, 1919	Hawaii	Kohala Mt.	Pololou	.13
July, 1919	Hawaii	Olaa Forest Park	Sec. C	.30
Aug., 1919	Hawaii	Olaa Forest Park	Sec. A	.19
Sept., 1919	Maui	Kula	Papaanui	2.68
Oct., 1919	Hawaii	Olaa Forest Park	Sec. C	.28
Dec., 1919	Maui	Kula	Waiohuli	1.40
Jan., 1920	Oahu	Kuliouou	Valley	.40
Sept., 1920	Hawaii	Olaa Forest Park	Sec. C	.25
Nov., 1920	Hawaii	Kau	Kaalaiki	.61
Dec., 1920	Hawaii	Olaa Forest Park	Sec. C	1.64
Total				10.79

FENCES REPAIRED, 1919-1920.

Date Completed.	Island.	Reserve.	Location.	Length (Miles).
Feb., 1919	Kauai	Moloaa	Moloaa	3.00
Oct., 1919	Kauai	Papapaholahola	Papapaholahola	.38
Jan., 1920	Oahu	Kuliouou	Valley	.71
Jan., 1920	Oahu	Kuliouou	Maunalua	.71
Dec., 1920	Oahu	Waianae-kai	Homesteads	.47
Total				5.27

REMOVAL OF STOCK FROM RESERVES.

Following the fencing of reserve boundaries comes the important work of ridding the forest of stock within the fenced areas. Permits to hunt wild quadrupeds in the reserve have been freely issued to responsible parties. Reports from these, which are by no means complete, show that during the past two years 384 wild goats, 55 wild cattle, and 435 wild pigs, a total of 874 wild animals, have been killed on forest reserves.

In cooperation with ranchers and plantations cattle which were tractable have been driven out of reserves. At the present time, tame cattle getting into reserves either accidentally through broken places or by the malicious design or the negligence of the owners, constitutes a greater nuisance and results in greater damage to the reserves than that caused by wild cattle. To strengthen the position of the Division of Forestry in carrying out this important feature of forest protection it is desirable to amend the present law (second sentence in Sub-section 9 of Section 481, R. L. H. 1915) by substituting the following:

"After a forest reservation, duly set apart and established, has been completely fenced, and after thirty days' public notice,

Plate V.

Photo by Kraebel.

Leased land below the Hilo Forest Reserve, Honomu, Hawaii. Showing forest destruction due to cattle grazing followed up by invasion of Hilo grass.

five insertions, of such accomplishment has been given by publication in a newspaper of general circulation in the county or city and county where such reservation is situated, the owner or lessee of land in such reservation, if such land be privately-owned and the agents of the board of agriculture and forestry in all cases where the land is so set apart and established as a forest reservation, whether from privately-owned lands or public lands, may without further notice remove, shoot, or destroy any and all cattle of any description found on any such forest land in the Territory without compensation to the owner."

This is made urgent by a recent opinion from the Attorney General (No. 950) in which he holds (1) that a violation of a regulation of this Board constitutes a criminal offense and to secure a conviction therefor all the elements of a criminal offense, including that of guilty knowledge or willfulness, must be shown and (2) that this Board is without authority to impose by regulation a penalty in the nature of liquidated damages for trespass by cattle on forest reserves.

FOREST FIRES.

During the biennial period there have been perhaps more fires than usual, due to the two comparatively dry years, but none of them fortunately did any considerable or extensive damage to native forest growth. The following fires were reported:

FERBUARY 27, 1919: Ohikea section of Kapapala Ranch, Kau, Hawaii. Fire of unknown origin burned over 1,500 acres of mostly grass land, but was extinguished the same day by ranch cowboys and laborers from Pahala Plantation under Fire Warden James Campsie.

FEBRUARY 29, 1919: Wailau, at the edge of the Kau Forest Reserve, Hawaii. A fire of unknown origin burned over 40 acres of forest land with considerable damage to undergrowth and a quantity of ohia trees. Men under Fire Wardens George Gibb and James Campsie soon extinguished it.

MAY 6, 1919: Pupukea Forest Reserve, Oahu. During some pineapple clearing operations a fire jumped the fire guard and burned over 40 acres of grass, damaging a few clumps of trees. Laborers working under Fire Warden F. S. Lyman extinguished it the same night.

JULY 6, 1919: Lihue, Honouliuli, Oahu. A bee-hive thief set fire to the grass with his smoking torch. The fire spread over 75 acres of grassland with practically no damage to trees. It was extinguished the same day by soldiers and laborers under Mr. A. W. Eames and Fire Warden A. A. Wilson.

JULY 6, 1919: A fire started on this day, presumably by pig hunters, burned over about 5,500 acres of pasture land in

Kaohe and Kaholalele, on the slopes of Mauna Kea, Hamakua, Hawaii, at an elevation of 5,000 to 7,000 feet. In spite of all efforts it continued to burn for approximately two months before it was extinguished by rains.

AUGUST, 1919: During this month two small fires, less than one acre each in extent, and which caused practically no damage, were extinguished almost at once by Ranger Hardy in the Na Pali-Kona Reserve, Kauai.

OCTOBER 1, 1919: A grass fire on the ridge in Nuuanu Valley adjacent to the Country Club, started by brush burners, swept over an area of 20 acres of grass and brush land on the slope, but was extinguished in three hours by the fire department and men working under Deputy Fire Warden Haughs.

NOVEMBER 9, 1919: Wainiha, Kauai. A fire started along the ditch trail burned over an area of staghorn fern, but was soon extinguished by men under Fire Warden A. Menefoglio.

JANUARY 25, 1920: Halawa, Oahu. A fire of unknown origin burned over 25 acres of steep open grass land on the ridge, but stopped the same night as soon as it reached the damper vegetation.

FEBRUARY 12, 1920: Pololou Gulch, Kohala Mt. Reserve, Hawaii. A fire was started by a small boy in the gulch bottom and the wind carried it up the west side of the gulch through the underbrush. Laborers under the direction of Manager J. A. McLennan promptly rushed to the scene and, fighting the fire from 8 a. m. to 4 p. m., succeeded in extinguishing it before it had done any considerable damage.

MAY 1, 1920: Woodlawn, Manoa Valley, Oahu. A fire started to clear land for the planting of pineapples jumped the fire guard at 3 p. m. and burned over about 10 acres of grass and ferns on a hillside. It was extinguished in 2½ hours by local men and officers from the Government Nursery.

MAY 11, 1920: Waiakea, Hawaii. A fire started from a cane trash fire and burned over about 300 acres of grass, brush, and young ohia trees on private land on the 1880 flow near Hilo. Very little of the old forest was touched, and it was extinguished the next day by men working under Fire Warden James Henderson and Ranger Mackenzie.

MAY 27, 1920: Koolau Forest Reserve, Maui. The first fire in 16 years in this wet forest started at 3:30 p. m. at Nahiku between Kapaula and Waiohue gulches, but was put under control by 7 p. m. the same day by men working under Fire Warden W. F. Pogue. Above the ditch it burned over 20 acres of forest in the reserve and below the ditch and outside of the reserve it burned over 175 acres.

JUNE 9, 1920: Olaa, Hawaii. A surface fire spread rap-

Plate VI.

Photo by Kraebel.

Luxuriant growth of trees and ferns on the protected government land of Laupahoehoe within the Hilo Forest Reserve, Hawaii. The adjacent grazing land absolutely lacks such growth.

idly over about 100 acres of private brush land in the region from 22 to 24 Miles near the Volcano Road, but was placed under control the same day by men working with Forest Ranger Mackenzie.

The voluntary District Fire Wardens appointed by the Board have rendered efficient and prompt service to the Territory and I wish here to express to them my appreciation of their faithful performance of duty in carrying out the forest fire laws. A number of new Fire Wardens were appointed during the period to replace those who had died, resigned or moved away.

A revised list of District Fire Wardens, and of honorary District Foresters and Forest Rangers, is presented at the end of this report.

FOREST EXTENSION.

BOTANY.

Mr. J. F. Rock, as Consulting Botanist, continued to render the Division valuable services by contributing two botanical bulletins, Nos. 5 and 6, which have been published and issued by the Division; an article on the poisonous plants of Hawaii, which appeared in the March and April 1920 "Forester," and a manuscript containing a revised list of Hawaiian names of plants (soon to be published) and by securing seed of new and valuable ornamental and forest trees from tropical countries for propagation by this Division.

Among the seed importations made by Mr. J. F. Rock was a consignment of 7 pounds of seed of one of the chaulmoogra oil trees, *Hydnocarpus anthelminticus,* received from Siam on November 27, 1920. The young seedlings resulting from this shipment are coming along nicely and when ready will be planted out in favorable places for the express purpose of supplying seed for the production of the oil which, when refined by the Dean process, will be used locally for the cure of leprosy.

For the purpose of record, mention is made here of the discovery by the Superintendent of Forestry on January 23, 1919, at Keaau, Oahu, at an elevation of 950 feet above the sea, of the mamani tree, *Sophora chrysophylla.* Small trees of these species were in both flower and fruit, which made the identification positive. So far as it is known, this is the first time that the mamani has been found on Oahu.

A working herbarium of specimens of native trees has been started by the Division of Forestry and will be added to as opportunity affords, so as to enable the staff to become better acquainted with our forest flora. Seeds of the native species and

especially the rare ones such as the native red cotton, *Kokia Rockii Kauaiensis,* are also collected on field trips so as to determine their ease of propagation, rate of growth, and adaptability for use in reforestation projects.

Seedling trees are now being assembled for use in planting out in the Makiki Valleys with the idea of establishing there, if a sufficient appropriation for labor is made, an accessible arboretum of classified and labelled trees, amounting to several thousand different kinds, from all tropical parts of the globe, which will in time serve as a living reference library for botanists and will be the wonder and admiration of visiting tourists and scientists.

TREE INTRODUCTION.

The importation of seed of new species from the other parts of the tropical world has been continued during the period, and the resulting seedlings when ready have been planted out in a variety of situations to determine their usefulness in our reforestation work in the solution of the great problem of reclothing with a forest growth areas which have been so badly denuded that they will not come back naturally to native species.

Cooperation has been rendered the Hawaiian Sugar Planters' Association in its project of securing and introducing fertilizing wasps so as to make possible the local production of fertile seed on our *Ficus* trees by sending the Board's Entomologist to Hong Kong and India.

The forestry division of the Hawaiian Sugar Planters' Association has also been quite active in the importation of seed of new species and has propagated a large variety of trees which are new to this Territory and which will be planted out in various situations with the same object in view. These two divisions have been working in close cooperation on these lines and have made frequent interchanges of seeds and seedlings.

The beneficial results of tree introduction to overcome the difficulty of securing supplies of seed have been obtained in the case of two valuable trees from specimens of which now growing in these Islands we are able to secure fresh seed and are therefore independent of importations. One of these, the Australian red cedar, *Cedrela australis,* a valuable timber tree introduced from Australia in 1914, began to produce abundant supplies of fertile seed in the summer of 1919. The other is the African tulip tree, *Spathodea campanulata,* a popular and handsome ornamental tree introduced from Madagascar on April 15, 1916, which in August, 1920, only four years after planting, is now producing good seed on a large number of individual trees.

In the efforts to disseminate seedlings of the valuable kauri pine, *Agathis australis,* throughout the Territory for the produc-

Plate VII.

Photo by Judd.

Kauri pine **(Agathis australis)** at the Government Nursery, Honolulu. Age 35 years. Height 66 feet. Diameter 25 inches.

tion of timber, two shipments of seed of this conifer were obtained through the efforts of Mr. Adolph Moritzson from Mr. E. Phillips Turner, Secretary of the Department of Forestry at Wellington, New Zealand. The germination of the several pounds of seed planted resulted in almost complete failure and only two seedlings were produced. It would seem, therefore, that for the propagation of this desirable timber tree we must depend upon the crop of seeds produced only at intervals by the mature trees already in these Islands.

During the latter part of December in the years 1919 and 1920, the Division was able to gladden the hearts of many children by supplying Christmas trees cut from a plantation of Japanese cedar, *Cryptomeria Japonica,* planted out in Makiki Valley in December, 1917, with this very object in view.

All sympathetic Honolulu residents were very sorry to see the original algaroba tree, *Prosopis juliflora,* in the Catholic Cathedral grounds on Fort street, Honolulu, cut down on October 23, 1919, to make room for the new Knights of Columbus building. Imported in 1828, this parent tree had stood there for 91 years as an object of historical interest and a monument to Father Bachelot, who introduced it. Perhaps no other tree the world over has been responsible for greater benefits than this original algaroba, for from it, by the distributing agency, mainly of stock, there has been established on the lee shores throughout these Islands extensive forests which now cover approximately 90,000 acres of what used to be barren land, but which by reason of this tree now produce an annual crop of about 30,000 cords of exceedingly valuable fuel wood, over $160,000 worth of honey, and an enormous yield of beans which furnish a valuable fattening food for stock at a time when the long, dry summer has exhausted the grass supply.

TREE PROPAGATION AND DISTRIBUTION.

The Division of Forestry has now in active operation seven tree nurseries on the four main islands, as follows:

1. Kalaheo Nursery, Kauai, in charge of Joe Rita, Jr.
2. Government Nursery, Honolulu, Oahu, in charge of David Haughs.
3. Makiki Nursery, Honolulu, Oahu, in charge of David Haughs.
4. Waiahole Nursery, Koolaupopo, Oahu, in charge of Alfred Rocha.
5. Mikilua Nursery, Waianae, Oahu, in charge of J. K. Luka.
6. Haiku Nursery, Maui, in charge of James Lindsay.
7. Hilo Nursery, Hawaii, in charge of Bro. Matthias Newell.

The nurseries numbered 4 and 5 are devoted to the production of trees for the exclusive use of planting on forest reserves, while all of the others produce trees for this purpose and for supplying the demands of homesteaders, agriculturists, army posts, ranches, and plantations throughout the Territory for forest, shade, fruit and ornamental trees and vines and shrubs.

Cognizant of the danger of disseminating insect pests to the other islands by shipping plants in soil, this Division early in 1919 voluntarily discontinued this practice. This was followed by the passing on June 1, 1919, of Rule XX of the Division of Plant Inspection, which prohibited the shipping of plants in soil from Oahu to the other islands except in very unusual cases. Hitherto, the demand for trees on the other islands was largely supplied from the Honolulu nurseries, and in order to meet this demand locally a new nursery was established in June, 1919, at Haiku, Maui, and the nursery in Hilo relocated and enlarged in the fall of 1920.

There were distributed from the nurseries, as will be seen in the report of the Forest Nurseryman, a total of 292,081 trees in 1919 and 223,966 trees in 1920, or a total of 516,047 during the two years. This is 135,364 trees less than during 1917 and 1918, but this difference can well be accounted for by the strike which made labor scarce and expensive and the two dry years which made conditions unfavorable for tree planting.

ARBOR DAY.

Arbor Day, as in previous years, was designated by proclamation of the Governor and celebrated by appropriate exercises and tree planting mostly by school children on November 21 in 1919 and on November 19 in 1920.

The number of trees distributed from the government nurseries for planting on Arbor Day during the last two years was as follows:

Nurseries.	1919.	1920.	Total.
Kalaheo Nursery, Kauai	....	200	200
Government Nursery, Honolulu	6,292	4,370	10,662
Haiku Nursery, Maui	....	920	920
Hilo Nursery, Hawaii	....	1,215	1,215
Totals	6,292	6,705	12,997

On the 1919 Arbor Day, 1,390 children, and on the 1920 Arbor Day, 1,732 children of a number of different races called in person at the Government Nursery and were given one tree each for planting.

Plate VIII.

Photo by Hosmer.

The original algaroba tree in Hawaii, now gone.

TREE PLANTING ON FOREST RESERVES.

By the efforts of this Division there were planted out during the two-year period almost twice the number of trees that was planted in the previous biennium. A total of 71,641 trees of 37 different species was set out on 11 different forest reserves on Kauai, Oahu, and Maui. From the list which follows it will be seen that an attempt has been made to start a great variety of trees in a number of places in order to determine the ones best suited to different localities so that attention can be centered on these in future plantings.

Trees Planted in Forest Reserves in 1919 and 1920.

Red gum (*Eucalyptus rostrata*)	13,843
Koa (*Acacia koa*)	12,573
Australian red cedar (*Cedrela australis*)	10,351
Red mahogany (*Eucalyptus resinifera*)	8,707
Yellow poinciana (*Peltophorum inerme*)	4,737
Ironwood (*Casuarina equisetifolia*)	3,537
Bloodwood (*Eucalyptus corymbosa*)	2,984
Ironbark (*Eucalyptus crebra*)	2,713
Swamp mahogany (*Eucalyptus robusta*)	1,844
Silk oak (*Grevillea robusta*)	1,842
Johore fig (*Ficus sp.*)	1,842
Monkey-pod (*Samanea saman*)	1,292
Cook pine (*Araucaria Cookii*)	1,062
Logwood (*Haematoxylum campechianum*)	757
Kauri pine (*Agathis australis*)	640
Mahogany (*Swietenia Mahogani*)	579
Molave (*Vitex parviflora*)	330
Japanese cedar (*Cryptomeria Japonica*)	310
Khair tree (*Acacia catechu*)	247
Kassod (*Cassia siamea*)	220
Mountain albizzia (*Albizzia montana*)	212
Sappan (*Caesalpinia sappan*)	180
Wiliwili (*Erythrina monosperma*)	170
Tall fig (*Ficus altissima*)	141
Blackwood (*Acacia melanoxylon*)	100
Banyan (*Ficus retusa intida*)	88
Lime (*Citrus medica acida*)	85
Peepul tree (*Ficus religiosa*)	50
Chinese banyan (*Ficus retusa*)	50
Narra (*Pterocarpus indicus*)	37
Wood-oil tree (*Aleurites Fordii*)	35
Red sandalwood (*Adenanthera pavonina*)	27
Camphor (*Cinnamomum camphora*)	25

Aralia (*Brassaia actinophylla*)	17
Arabian teak (*Cordia amplifolia*)	14
Naio, bastard sandalwood (*Myoporum Sandwicense*)	7
Rimu, red pine (*Dacrydium cupressinum*)	2
Total	71,641

On Kauai, swamp mahogany and silver oak were planted on the Kealia Reserve, and at the Papapaholahola Spring Reserve, swamp mahogany, ironwood, and Australian blackwood trees were set out.

On Oahu the planting of koa trees has been continued on the Honolulu Watershed in the Makiki Valleys, and this species has been found so far to take hold on the well-drained slopes here and in Manoa Valley and to grow faster and form a better cover than any introduced species. In a protected pocket back of Sugar Loaf 835 Australian red cedar trees were set out in June and July, 1920, to determine their growth and behavior at that elevation.

The largest plantings have been made at Mikilua, Waianae, in the Lualualei Forest Reserve, Oahu, where a gang of seven Hawaiian tree planters have set out during the two years 57,512 trees of 22 different species in the effort to strike on a number of trees best suited to the region. At the summit of Kolekole Pass the native koa has been planted and is growing well. On the middle slopes a variety of trees such as monkeypod, yellow poinciana, kassod, silk oak, sappan, ironwood, banyans, Australian red cedar, and Cook pine have been used with success, and on the lower dry foothills the drought-resisting khair, logwood, and wiliwili and the more valuable eucalyptus such as red gum, bloodwood, red mahogany, and ironbark have been planted. The results of the planting in this region, which has now been going on for only 2½ years, are already making a marked change in the landscape, and I am confident that the beneficial effect of this planted forest on a more continued and steady supply of water in Mikilua Valley will be apparent in a few years.

A row of highland ironwood trees was set out inside of the new forest reserve fence in Keaau Valley, Waianae, in March, 1919, and 555 red gum trees were similarly planted along the new fence in Kuliouou Valley in February, 1920.

At Waiahole, Oahu, 2,764 trees of 17 different varieties have been planted out during the period on a fenced portion of the forest reserve by the only faithful day laborer who could be secured in the district. Among the species which are growing well here are the molave and narra from the Philippines, Arabian teak, the native bastard sandalwood (*Naio*), Cook pine, Japan-

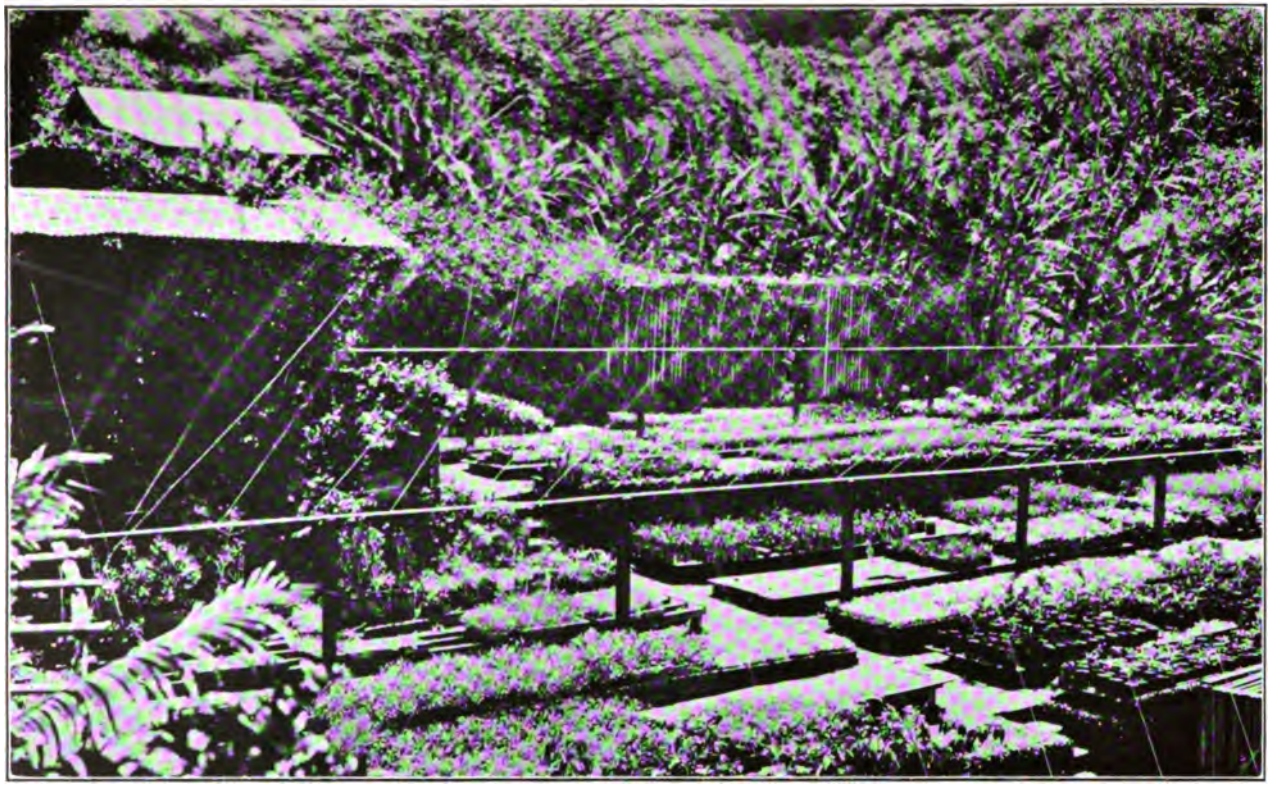


Photo by Judd.

Makiki Nursery, Honolulu, showing Skinner system of irrigation.

ese cedar, and the kauri pine. Of the last, which is the valuable timber tree from the north island of New Zealand, 640 trees have been planted out, with a 10 by 10-foot spacing, to determine their habits and rate of growth in plantation formation.

At Paumalu, on the Pupukea Reserve, 500 banyan, koa, and Australian red cedar trees were planted out in December, 1920, under an agreement whereby in return for the use of certain lands for pineapples, trees will be planted on other parts of this reserve each year. In this manner, all open spaces on this reserve will be reforested within five or six years.

On Maui, Ranger Lindsay has planted out the mountain albizzia and Australian red cedar trees on the Makawao and Kula Reserves.

It is hoped that by the use of this diversity of species in many different localities a number of valuable and fast-growing trees can be determined upon by observation for future use in reforestation projects.

ADVICE ON TREE PLANTING.

A large part of the time of the Forest Nurseryman is devoted to giving advice and assistance connected with tree planting, and this Division always stands ready to do all within its power and means to help the public in this worthy work. In addition to this, the Superintendent on May 16, 1919, prepared and submitted to the President of Oahu College, at his request, a planting scheme for the Punahou campus, with recommendations and a list of trees for planting, in which Hawaiian species of trees and shrubs were favored almost exclusively. He has also, in cooperation with the Outdoor Circle, assisted the Commanding General at Schofield Barracks by advising on the beautification of the new officers' quarters by the planting of suggested trees and shrubs. Advice on the use of hedge plants and vines for certain purposes at Fort Armstrong and Fort De Russy was also given.

TREE PLANTING THROUGHOUT THE TERRITORY.

As in past years, an attempt has been made to ascertain the number of trees planted throughout the Territory and the purposes for which the planting was done. The results for the past two years, while not complete, are shown in the following table and indicate that there has been a falling off of over half a million trees planted, when compared with the previous biennium. Disturbed labor conditions and the two dry years are no doubt responsible for this.

TREES PLANTED IN THE TERRITORY OF HAWAII IN 1919 AND 1920.

Kauai:	1919.	1920.	Total.
Gay & Robinson	1,250	3,720	4,970
Grove Farm Plantation	30,500	.....	30,500
Hawaiian Sugar Co.	20,000	.....	20,000
Kilauea Sugar Plantation Co.	10,000	34,974	44,974
Knudsen Bros.	.....	1,000	1,000
Koloa Sugar Co.	.....	2,767	2,767
Makee Sugar Co.	9,250	5,395	14,645
McBryde Sugar Co., Ltd.	4,211	4,086	8,297
Territory of Hawaii	2,174	.....	2,174
	77,385	51,942	129,327
Oahu:			
California Packing Corporation	4,000	.....	4,000
Cooke, Mrs. C. M.	.....	74	74
Ewa Plantation Co.	283	449	732
Hawaiian Pineapple Co.	101,000	3,000	104,000
Honolulu Lighthouse	.....	78	78
Koolau Agricultural Co.	.....	10,514	10,514
Laie Plantation	600	500	1,100
Marconi Wireless Tel. Co.	24	.....	24
Oahu Sugar Co.	.....	10	10
O. R. & L. Co. Ranch	2,328	620	2,948
Robinson, J. L. P. et al.	.....	250	250
Territory of Hawaii	30,474	38,775	69,249
U. S. Army	5,000	8,395	13,395
U. S. Navy	.....	1,077	1,077
Wahiawa Water Co.	1,600	300	1,900
Waialua Agricultural Co.	26,030	100	26,130
	171,339	64,142	235,481
Lanai:			
Lanai Company	1,000	1,700	2,700
Maui:			
Haleakala Ranch Co.	.....	7,135	7,135
Hawaiian Commercial & Sugar Co.	1,000	1,000	2,000
Honolua Ranch	55,000	13,000	68,000
Krauss, F. G.	40	.....	40
Maui Agricultural Co.	234,600	116,350	350,950
Pioneer Mill Co.	5,000	3,275	8,275
Pogue, W. F.	250	890	1,140
Territory of Hawaii	.....	218	218
Wailuku Sugar Co.	23,213	31,041	54,254
	320,103	174,609	494,712
Hawaii:			
Hakalau Plantation Co.	124	924	1,048
Hamakua Mill Co.	.....	37,200	37,200
Hawaiian Agricultural Co.	30,000	32,320	62,320
Hawaii Consolidated Railway	212	.....	212

Plate X.

Photo by Kraebel.

Children of many races calling at Government Nursery, Honolulu, for trees to plant on Arbor Day.

Hawaiian Irrigation Co.	300	500	800
Hawi Mill and Plantation Co.	3,600	3,500	7,100
Hilo Sugar Co.	.....	15	15
H. S. P. A. Experiment Station	.....	5,500	5,500
Hutchinson Sugar Plantation Co.	1,050	.....	1,050
Kaiwiki Sugar Co.	50	1,500	1,550
Kohala Sugar Co.	24,000	15,000	39,000
Laupahoehoe Sugar Co.	.....	1,220	1,220
Niulii Mill & Plantation	.....	460	460
Onomea Sugar Co.	.....	50	50
Paauhau Sugar Plantation Co.	5,000	10,000	15,000
Parker Ranch	3,800	14,781	18,581
Union Mill Co.	.....	6,430	6,430
	68,136	129,400	197,536
Total for all Islands	636,963	420,093	1,057,056

The same figures arranged according to the principal species planted and the purpose of planting are as follows:

TREES PLANTED IN THE TERRITORY OF HAWAII IN 1919 AND 1920, SHOWING SPECIES AND PURPOSE OF PLANTING.

	Purpose of Planting				
Species.	Watershed Cover.	Fuel.	Wind-break.	Orna-ment.	Total.
1919:					
Swamp mahogany	203,424	54,044	3,350	15,000	275,818
Blue gum	38,400	106,050	.....	.....	144,450
Ironwood	16,793	80,862	25,387	10,000	133,042
Red gum	.....	22,800	12,282	1,000	36,082
Miscellaneous	8,879	600	4,931	3,573	17,983
Eucalyptus spp.	1,968	13,782	2,212	.....	17,962
Koa	8,556	.....	.....	.....	8,556
Silk oak	2,448	622	.....	.....	3,070
Totals	280,468	278,760	48,162	29,573	636,963
1920:					
Ironwood	16,549	8,563	78,141	3,449	106,702
Swamp mahogany	47,868	42,601	4,000	2,480	96,949
Blue gum	55,500	3,200	.....	.....	58,700
Red gum	31,661	1,000	14,110	800	47,571
Miscellaneous	26,121	250	998	7,398	34,767
Araucaria spp.	15,562	.....	.....	78	15,640
Eucalyptus spp.	5,095	6,821	.....	575	12,491
Australian red cedar	11,059	.....	.....	100	11,159
Ficus spp.	8,883	.....	.....	90	8,973
Red mahogany	8,707	.....	.....	.....	8,707
Java plum	.....	7,500	1,055	.....	8,555
Koa	6,114	.....	525	.....	6,639
Algaroba	3,000	240	.....	.....	3,240
Totals	236,119	70,175	98,829	14,970	420,093

From the above tables it will be observed that tree planting for the purpose of establishing a forest cover on watersheds still holds the lead, and that while the number of trees planted in 1920 was 216,870 less than in 1919, there was a far greater variety of trees in large numbers used for planting, indicating the desire to improve on the species used in past years.

MISCELLANEOUS ACTIVITIES.

COOPERATION WITH THE LAND OFFICE.

In matters pertaining to lands in and near forest reserves there has been the closest cooperation with the Land Office, especially in land exchanges and the requiring of fencing in general leases which abut forest reserves. Technical assistance and advice have also been rendered the Land Office in connection with algaroba-cutting licenses at Waianae, Oahu and Kihei, Maui, by prescribing and directing the thinnings so that the remaining trees will put on more growth and produce bigger yields of honey, beans and wood.

COOPERATION WITH THE NATIONAL PARK SERVICE.

This Division has attempted to give every possible assistance to federal officials in charge of the Hawaii National Park so as to make easier their task of placing sections of the park under administration. From April 19 to 30, 1919, at the request of Governor McCarthy, I accompanied Mr. Stephen T. Mather, Director of the National Park Service, and his party on an inspection of the Kilauea and Haleakala Sections of the park, giving information and assistance in the inspection of the lands. From March 20 to April 3, 1920, at the direction of the Acting Governor, I was with Mr. Horace M. Albright, Supervisor of the Yellowstone National Park and Field Assistant to the Director, as the special representtaive of the Territory in inspecting all three sections of the Hawaii National Park and in viewing the park possibilities of Waimea Canyon, Kauai. Our itinerary took us to Kilauea, the 1920 Kau flow, Puuhuluhulu, Puu Ulaula, where one night was spent at an elevation of 10,300 feet on the slopes of Mauna Loa, and Kona, on Hawaii; to Iao Valley and to the top of and through the crater of Haleakala, on Maui; and to Waimea Canyon and Kalalau Valley, on Kauai. Mr. Albright was more than pleased with the scenic aspect and possibilities of every place he saw, but left with the opinion that a National Park is not a present necessity at Waimea Canyon in view of the arrangements which have been made by this Division and the County of Kauai for giving the people an opportunity to visit

Photo by Kraebel.

Puu Kailio in the Lualualei Forest Reserve on the Waianae side of Kolekole Pass, Oahu, where the Division of Forestry is reforesting the dry slopes for the conservation of water.

the canyon and to camp in its vicinity, which abounds in such a variety of splendid recreational opportunities. Assistance was also rendered Mr. Albright by securing maps and information pertaining to the acquisition of private lands within the Kilauea Section and to government lands for the purpose of enlarging the present area of this section.

KOKEE CAMPS, KAUAI.

The area in the Na Pali-Kona Forest Reserve, on Kauai, at the bracing elevation of 3,500 feet, in the region of Kokee and Halemanu, which has been opened to campers, has been enjoyed by a large number of lovers of the out-doors during the two seasons. A total number of 37 revocable ten-year permits have been issued for the camping sites, which vary from 0.3 acre to 2 acres in size; seven permits have been revoked for non-payment of rent or upon request; and 30 permits were in effect on January 1, 1921. Substantial new improvements have been made on 10 of the camp sites. Complaints against non-compliance with the sanitary regulations were investigated in November, 1919, and the situation was satisfactorily adjusted.

FAIR EXHIBITS.

The Division participated in the Second Territorial Fair held in Honolulu on June 9 to 14, 1919, and in the Maui County Fair held at Kahului on October 21 to 23, 1920, by exhibiting its display of seedling and transplant trees, wood specimens and working erosion model to show the beneficial effect of a forest cover on the runoff. The exhibits attracted greater attention and more favorable comment than ever, and were much admired as instructive object lessons by all who saw them.

EDUCATION.

In addition to featuring the educational side of forestry at these fairs, special lectures on forestry have been given by the Superintendent as follows: At the Territorial Summer School held at Kilauea, Hawaii, two courses of lectures were given from August 1 to 18, 1919, on (1) "Elementary Forestry" and (2) "The Hawaiian Forests." On October 27 and 29 and November 1, 1919, three lectures on "Forestry in Hawaii" were given at the short course for plantation men held at the College of Hawaii under the joint auspices of the College and the Hawaiian Sugar Planters' Association. These lectures covered the beneficial effects of forests in general, a description of the native Hawaiian forests, their susceptibility to injury and the functions

they perform, and methods of protecting them, and they were printed in the November, 1919, "Forester." On October 16, 1919, I began fortnightly instructions in forestry, at the request of the Commanding General of the Hawaiian Department, at the vocational school for enlisted men at Schofield Barracks, alternating with the practical instruction given by the Forest Nurseryman. This course, which lasted for two months, covered a detailed study of three leading species of trees and the practical nursery work of raising them from seed. On November 20, 1919, I gave a luncheon talk before the Rotary Club on Arbor Day.

PUBLICATIONS.

The following bulletins and articles, in addition to the monthly and annual reports which have appeared in the official magazine of the Board, "The Hawaiian Forester and Agriculturist," have been published by the Division of Forestry during the past two years:

January, 1919—"Eucalyptus Plantation. Report on Experimental Plantation," by C. S. Judd, Superintendent of Forestry.

February, 1919—"On Government Forest-Reserve Lands at Kulani, Hawaii," by J. F. Rock, Consulting Botanist.

March 17, 1919—"Report of the Division of Forestry for the Biennial Period Ended December 31, 1918."

March, 1919—"A Volume Table for Algaroba," by C. S. Judd, Superintendent of Forestry.

June, 1919—"The Arborescent Indigenous Legumes of Hawaii," Botanical Bulletin No. 5, by J. F. Rock, Consulting Botanist.

June, 1919—"The Hawaiian Genus *Kokia*—A Relative of the Cotton," Botanical Bulletin No. 6, by J. F. Rock, Consulting Botanist.

September, 1919—"The Kukui or Candlenut Tree," by C. S. Judd, Superintendent of Forestry.

November, 1919—"Forestry in Hawaii." 1. The beneficial effects of forests. 2. The native Hawaiian forests. 3. Methods of forest protection. By C. S. Judd, Superintendent of Forestry.

February, 1920—"The Koa Tree," by C. S. Judd, Superintendent of Forestry.

March, 1920—"The Poisonous Plants of Hawaii," by J. F. Rock, Consulting Botanist.

March, 1920—"The Australian Red Cedar," by C. S. Judd, Superintendent of Forestry.

April, 1920—"The Wiliwili Tree," by C. S. Judd, Superintendent of Forestry.

Photo by Rock.

Waipoo Falls at the head of Waimea Canyon, near the Kokee Camps in the Puu Ka Pele Forest Reserve, Kauai.

May, 1920—"The Makiki Nursery," by C. S. Judd, Superintendent of Forestry.
June, 1920—"The Kauri Pine," by C. S. Judd, Superintendent of Forestry.
November, 1920—"Exhibit at the Maui County Fair," by C. J. Kraebel, Assistant Superintendent of Forestry.
December, 1920—"Algaroba Seed Germination Tests," by C. S. Judd, Superintendent of Forestry.
In course of publication—"Revised List of Hawaiian Names of Plants," by J. F. Rock, Consulting Botanist.

SUMMARY.

In conclusion, it is a pleasure to assert that by the efforts of this Division during the past two years much progress has been made in converting the forest reserves from mere delineations on paper to protected forest areas actually under administration. The task of putting them into the best possible shape is no small undertaking, and your assistance in the work of forest protection is respectfully solicited by lending your best efforts for securing appropriations which will adequately compensate the present force, enable the appointment of three new much-needed forest rangers, and make possible the construction of fences which are now needed on forest reserve boundaries to prevent the ravages of stock, for strengthening by legislative action the present law concerning the riddance of stock from forest reserves; and for the adoption of the proposed rule to prevent the further spread of Hilo grass on the Honolulu watershed.

It is recommended that the future work of this Division be confined as closely as possible to actual work on the forest reserves.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry and Chief Fire Warden.

LIST OF FIRE WARDENS, TERRITORY OF HAWAII

CHIEF FIRE WARDEN.

C. S. JUDD, Superintendent of Forestry, ex-officio.

DEPUTY FIRE WARDENS AT LARGE.

DAVID HAUGHS, in and for the Territory of Hawaii.
C. J. KRAEBEL, in and for the Territory of Hawaii.

DISTRICT FIRE WARDENS.

KAUAI.

A. MENEFOGLIO, in and for Wainiha Valley, District of Halelea.
W. F. SANBORN, in and for the District of Halelea, excepting Wainiha Valley.
L. D. LARSEN, in and for the District of Koolau, excepting the land of Anahola.
E. M. CHEATHAM, in and for that portion of the District of Koolau and Puna extending from the land of Anahola to the land of Olohena, inclusive.
H. D. SLOGGETT, in and for that portion of the District of Puna south of and including the land of Wailua.
F. A. ALEXANDER, in and for that portion of the District of Kona extending from Hanapepe Valley to the Puna District line.
B. D. BALDWIN, in and for that portion of the District of Kona lying between and including the Waimea, Poomau, and Kauaikinana Valleys on the west and Hanapepe Valley on the east.
E. A. KNUDSEN, in and for the District of Na Pali and that portion of the District of Kona lying to the west of Waimea, Poomau, and Kauaikinana Valleys.

OAHU.

KARSTEN THOT, in and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.
ANDREW ADAMS, in and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.
FRANK VAUGHAN, in and for that portion of the District of Koolaupoko extending from the Koolauloa District line to the land of Heeia.
FRANK ANDRADE, in and for that portion of the District of Koolaupoko extending from and including the land of Heeia to the land of Kailua.
JOHN HERD, in and for that portion of the District of Koolaupoko extending from and including the land of Kailua to Makapuu Point.
CHARLES LUCAS, in and for that portion of the District of Kona extending from Makapuu Point to Palolo Valley.
JACK NAIWI, in and for Manoa Valley, District of Kona.
C. M. COOKE, in and for Manoa Valley, District of Kona.
L. A. MOORE, in and for Nuuanu Valley, District of Honolulu.
WM. WEINRICH, in and for that portion of the District of Ewa lying to the west of Kamehameha Highway.

JAMES GIBB, in and for that portion of the District of Ewa lying between the lands of Moanalua and Waiawa.

H. BLOOMFIELD BROWN, in and for that portion of the District of Ewa lying to the east of Kamehameha Highway between the land of Waipio and Kaukonahua Gulch.

A. A. WILSON, in and for that portion of the District of Waialua lying between Kaukonahua and Helemano Gulches.

G. M. ROBERTSON, in and for that portion of the District of Waialua lying between Helemano and Opaeula Gulches.

GEORGE WILSON, in and for that portion of the District of Waialua lying between Opaeula Gulch and the Koolauloa District line.

ERNEST BRECHT, in and for that portion of the District of Waianae lying to the west of the Waianae Mts.

MOLOKAI.

JAMES MUNRO, in and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.

E. K. DUVAUCHELLE, in and for that portion of the Island of Molokai, including and lying to the east of Wailau Valley and the land of Mapulehu.

LANAI.

G. C. MUNRO, in and for the Island of Lanai.

MAUI.

A. W. COLLINS, in and for the District of Lahaina.

D. T. FLEMING, in and for the District of Kaanapali.

C. E. S. BURNS, in and for the District of Wailuku.

F. F. BALDWIN, in and for the District of Hamakuapoko and the west half of the District of Hamakualoa.

W. F. POGUE, in and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi Gulch.

MARION CABRAL, in and for that portion of the District of Koolau lying to the east of Makapipi Gulch.

JOHN CHALMERS, in and for the District of Hana.

JOHN FASSOTH, in and for the District of Kipahulu.

L. VON TEMPSKY, in and for the District of Kula and Kaupo.

HAWAII.

G. C. WATT, in and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.

S. P. WOODS, in and for that portion of North Kohala extending from the northern boundary of the land of Kawaihae I. to and including the land of Kaauhuhu.

A. W. CARTER, in and for the District of South Kohala.

W. P. NAQUIN, in and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.

D. S. MACALISTER, in and for that portion of the District of Hamakua extending from and including the land of Kukaiau to the Hilo District line.

JOHN M. ROSS.

JOE J. IGNACIO, Assistant District Fire Warden, in and for that portion of the District of Hilo extending from the Hamakua District to the land of Makahanaloa.

JOHN T. MOIR, in and for that portion of the District of Hilo extending from and including the land of Makahanaloa to the land of Kikala.

JAMES HENDERSON, in and for that portion of the District of Hilo extending from the Puna District line to and including the land of Kikala.

A. J. WATT, in and for the District of Puna.

JAMES CAMPSIE, in and for that portion of the District of Kau extending from the Puna District line to and including the land of Punaluu.

GEORGE GIBB, in and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.

R. A. McWAYNE, in and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.

T. C. WHITE, in and for that portion of the District of Kona extending from the land of Kaapuna to and including the land of Hookena.

A. C. DOWSETT, in and for that portion of the District of Kona extending from the land of Hookena to and including the land of Kaawaloa.

T. C. WHITE, in and for that portion of the District of Kona extending from the land of Kaawaloa to and including the land of Kahaluu.

A. J. STILLMAN, in and for that portion of the District of Kona extending from the land of Kahaluu to the Kohala District line.

FOREST RANGERS.

Kauai.

HOSEA K. LOVELL, for Kauai.

Oahu.

DAVID KAPIHI, for Tantalus and Makiki.
E. H. HIPPLE, for Palolo, Manoa and Nuuanu.
DANIEL KAPAHU, for Waianae District except Waianae Valley.

Maui.

JAMES LINDSAY, for Maui.

Hawaii.

A. J. W. MACKENZIE, for Olaa.
CHARLES E. STONE, for South Kona and Kau.

ANTONE P. AGUIAR, for the Panaewa Reserve.
HARRY L. DENISON, for the Kohala Mt. and Hamakua Pali Reserves.

FOREST RANGER AT LARGE.

V. L. ELLIS, for the Territory of Hawaii.

HONORARY FOREST RANGERS.

J. P. PICO, for the Waianae-kai Reserve, Oahu.
B. CARTWRIGHT, JR., for the enforcement of Rule IV. on Oahu.

NURSERY AGENTS.

JOE RITA, JR., Kalaheo, Kauai.
A. ROCHA, Waiahole, Oahu.
JAMES LINDSAY, Haiku, Maui.
BRO. M. NEWELL, Hilo, Hawaii.

DISTRICT FORESTERS.

Kauai.

L. D. Larsen, E. Broadbent, J. M. Lydgate, W. D. McBryde, E. A. Knudsen, B. D. Baldwin.

Oahu.

Andrew Adams, L. L. McCandless, John Herd, W. W. Goodale.

Molokai.

James Munro and E. K. Duvauchelle.

Lanai.

G. C. Munro.

Maui.

A. W. Collins, F. F. Baldwin, W. F. Pogue, L. von Tempsky, J. H. Raymond, D. T. Fleming, John Fassoth.

Hawaii.

G. C. Watt, A. W. Carter, W. P. Naquin, J. M. Ross, George Gibb, and James Campsie.

LANDS IN FOREST RESERVES.

TERRITORY OF HAWAII.

January 1, 1921.

Island of Kauai.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
NA PALI KONA No. 13 Proclaimed June 12, 1907	Haena	500	....	....	....	500
	Hanakapiai	....	....	130	130	130
	Na Pali ...	....	....	10,340	10,340	10,340
	Milolii	....	5,808*	....	5,808	5,808
	Waimea ...	....	....	24,372	24,372	24,372
	Makaweli ..	10,030	....	....	....	10,030
	Hanapepe ..	9,360	....	....	....	9,360
		19,890	5,808	34,842	40,650	60,540
PUU KA PELE No. 45 Proclaimed Dec. 31, 1918	Waimea ...	....	....	1,800	1,800	1,800
	Waimea ...	....	2,685*	....	2,685	2,685
		....	2,685	1,800	4,485	4,485
PAPAPA-HOLAHOLA SPRING No. 41 Proclaimed June 19, 1918	Kalaheo ...	....	....	54	54	54
LIHUE-KOLOA No. 19 Proclaimed June 5, 1909	Hanapepe ..	10	....	....	....	10
	Wahiawa ..	2,060	....	15	15	2,075
	Kalaheo ...	....	....	1,275	1,275	1,275
	Lawai	350	....	....	....	350
	Koloa	980	....	....	....	980
	Haiku	2,900	....	....	....	2,900
	Hanamaulu	9,361	....	....	....	9,361
	Wailua	....	....	11,231	11,231	11,231
	N. Olohena .	....	....	150	150	150
	Waipouli ..	....	....	270	270	270
		15,661	....	12,941	12,941	28,602
NONOU No. 44 Proclaimed Dec. 31, 1918	Wailua Uka	....	....	214	214	214
	Wailua Kai	....	361†	....	361	361
	Waipouli and N. Olohena .	....	42‡	....	42	42
	S. Olohena .	....	201‡	....	201	201
		....	604	214	818	818

Island of Kauai—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
KEALIA	Kapaa	....	....	2,290	2,290	2,290
No. 6	Kealia	2,470	....	....	....	2,470
Proclaimed	Kamaloma-					
Mar. 9, 1906	loo	....	....	630	630	630
	Anahola ...	....	....	3,660	3,660	3,660
		2,470	....	6,580	6,580	9,050
MOLOAA	Aliomanu ..	125	....	....	....	125
No. 20	Moloaa	8	....	....	....	8
Proclaimed	Papaa-Mo-					
June 5, 1909	loaa	....	....	2,160	2,160	2,160
	Pilaa	40	....	....	....	40
	Papaa	5	....	....	....	5
	Papaa	....	....	1,418	1,418	1,418
	Kahili	475	....	....	....	475
	Kilauea ...	1,390	....	....	....	1,390
		2,043	....	3,578	3,578	5,621
HALELEA	Kalihiwai ..	5,685	....	....	....	5,685
No. 5	Hanalei ...	....	....	8,340	8,340	8,340
Proclaimed	Waioli	....	....	2,650	2,650	2,650
Aug. 24, 1914	Waipa	800	....	....	....	800
	Lumahai ...	8,975	....	....	....	8,975
	Wainihi ...	11,050	....	....	....	11,050
		26,510	....	10,990	10,990	37,500
Totals for Kauai		66,574	9,097	70,999	80,096	146,670

*Lease expires June 1, 1921.
†Lease expires July 1, 1921.
‡Lease expires January 14, 1921.

Island of Oahu.

Name of Reserve	Name of Land	Private Land, Acres	Government Land, Acres*	Total Acres
KUAOKALA No. 30 Proclaimed June 4, 1913	Kuaokala	....	434	434
MAKUA-KEAAU No. 29 Proclaimed June 4, 1913	Kahanahaiki	....	970	970
	Makua	....	1,660	1,660
	Ohikilolo	340	....	340
	Keaau	....	1,850	1,850
		340	4,480	4,820
WAIANAE-KAI No. 10 Proclaimed Sept. 7, 1906	Waianae-Kai	....	3,546	3,546
	Waianae Grants .	107	....	107
		107	3,546	3,653
LUALUALEI No. 11 Proclaimed Nov. 30, 1906	Lualualei	....	3,743	3,743
NANAKULI No. 28 Proclaimed June 4, 1913	Nanakuli	....	1,010	1,010
KULIOUOU No. 35 Proclaimed Feb. 13, 1914	Kuliouou	....	214	214
MANOA RANGER STATION No. 38 Proclaimed May 9, 1916	Kahoiwai	....	15	15
ROUND TOP No. 39 Proclaimed Aug. 10, 1916	Makiki	....	115	115
HONOLULU WATERSHED No. 34 Proclaimed Oct. 13, 1913	Palolo	....	910	910
	Manoa	....	780	780
	Makiki	....	563	563
	Kalawahine	....	255	255
	Nuuanu	....	2,160	2,160
	Kalihi	....	330	330
	Scattered in above	1,952	....	1,952
		1,952	4,998	6,950

Island of Oahu—Continued.

Name of Reserve	Name of Land	Private Acres Land,	Government Land, Acres*	Total Acres
EWA No. 7 Proclaimed Mar. 9, 1906	Halawa	3,846	....	3,846
	Aiea	....	383	383
	Kalauao	1,538	....	1,538
	Waimalu	2,238	....	2,238
	Waiau	1,320	....	1,320
	Waimano	....	790	790
	Manana	1,090	....	1,090
	Waiawa	4,040	....	4,040
	Waipio	5,080	....	5,080
	Waianae-Uka	4,247	....	4,247
	Wahiawa	....	3,978	3,978
		23,399	5,151	28,550
WAIAHOLE No. 42 Proclaimed June 19, 1918	Makawai	....	889	889
	Kapikokau	....	54	54
	Waianu I	....	186	186
	Makawai Apanas	5	....	5
	Waianu I Apana	1	....	1
	Waianu I, Portion	2	....	2
	Hanakea	32	....	32
		40	1,129	1,169
HAUULA No. 47 Proclaimed Dec. 31, 1918	Kahana	3,920	....	3,920
	Punaluu L. C. A.'s	28	....	28
	Punaluu	2,950	....	2,950
	Makaua	48	....	48
	Waiono	47	....	47
	Kaluanui	1,033	....	1,033
	Makao	24	....	24
	Hauula	....	1,143	1,143
		8,050	1,143	9,193
KAIPAPAU No. 1 Proclaimed Nov. 10, 1904	Kaipapau	....	913	913
PUPUKEA No. 21 Proclaimed May 10, 1910	Pupukea-Paumalu	....	864	864
MOKULEIA No. 46 Proclaimed Dec. 31, 1919	Mokuleia	....	5,850	5,850
	Kawaihapai	....	320	320
	Kealia	....	120	120
		....	6,290	6,290
Totals for Oahu		33,888	34,045	67,933

*There are no leased government lands in any reserve on Oahu.

Island of Molokai.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Land, Acres	Unleased Land, Acres	Total Acres	
MOLOKAI No. 26 Proclaimed Sept. 11, 1912	Iloli	156	....	....	....	156
	Naiwa	70	....	....	....	70
	Kahanui ...	317	....	....	....	317
	Kalamaula .	....	....	1,621	1,621	1,621
	Kahanui G-3437 ...	1,048	....	....	....	1,048
	Kaunakakai	965	....	....	....	965
	Kapaakea ..	....	....	220	220	220
	Kamiloloa 1	....	....	490	490	490
	Kamiloloa 2	....	....	550	550	550
	Makakupaia mauka ...	....	....	490	490	490
	Makakupaia makai ...	654	....	....	....	654
	Kawela	3,850	....	....	....	3,850
	Makolelau .	253	....	....	....	253
	Kamalo	1,600	....	....	....	1,600
	Kapualei, Kamueli, Wawaia	923	....	....	....	923
	Puaahala ..	....	....	163	163	163
	Kaamola ...	33	....	....	....	33
	Keawanui ..	182	....	....	....	182
	W. Ohia ...	172	....	....	....	172
	E. Ohia ...	....	220*	....	220	220
	Manawai ..	416	....	....	....	416
	Kahananui .	....	182†	....	182	182
	Ualapue ...	....	194†	....	194	194
	Kaluaaha ..	694	....	....	....	694
	Mapulehu ..	1,007	....	....	....	1,007
	Ili o Punaula	152	....	....	....	152
	Pukoo	....	....	124	124	124
	Kupehe	63	....	....	....	63
	Ahaino 1 ..	....	....	96	96	96
	Ahaino 2 ..	100	....	....	....	100
	Honomuni ..	415	....	....	....	415
	Kawaikapu	67	....	....	....	67
	Kainalu ...	572	....	....	....	572
	Puelehe ...	14	....	....	....	14
	Puniuohua 1	2	....	....	....	2
	Puniuohua 2	2	....	....	....	2
	Waialua ...	627	....	....	....	627
	Moanui	282	....	....	....	282
	Honouliwai .	....	....	378	378	378
	Honoulimaloo	175	....	....	....	175
	Lupehu	83	....	....	....	83
	Pohakupili .	9	....	....	....	9
	Mokea	218	....	....	....	218
	Keopukauuku	16	....	....	....	16
	Keopukaloa	810	....	....	....	810
	Halawa	7,190	....	....	....	7,190
	Wailau	....	8,540‡	....	8,540	8,540
	Pelekunu ..	4,512	....	....	....	4,512
	Waikolu ...	3,400	....	....	....	3,400
	Makanalua .	142	....	....	....	142
	Kahanui G-3539 ..	215	....	....	....	215
		31,406	9,136	4,132	13,268	44,674
Totals for Molokai		31,406	9,136	4,132	13,268	44,674

*Lease expires August 17, 1923.
†Lease expires January 1, 1925.
‡Lease expires June 28, 1928.

Island of Maui.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
WEST MAUI No. 14 Proclaimed April 21, 1908	Ukumehame and Olowalu	....	....	7,655	7,655	7,655
	Launiupoko.	1,455	....	....	....	1,455
	Puehuehu ..	440	....	....	....	440
	Kauaula ...	1,455	....	....	....	1,455
	Kuia, Panaewa and Paunau ..	....	....	2,100	2,100	2,100
	Paunau	210	....	....	....	210
	Kuholilea ..	120	....	....	....	120
	Puuiki	....	....	205	205	205
	Halakaa ...	255	....	....	....	255
	Wahikuli ..	....	....	1,550	1,550	1,550
	Hanakaoo .	720	....	....	....	720
	Honokowai .	....	....	1,410	1,410	1,410
	Kahana and Mahinahina.	330	....	....	....	330
	Mailepai ...	120	....	....	....	120
	Alaeloa	30	....	....	....	30
	Honokahua Honolua and Honokohau .	5,720	....	....	....	5,720
	Kahakuloa .	....	....	5,900	5,900	5,900
	Waihee	4,220	....	....	....	4,220
	Kou	....	....	285	285	285
	Hananui ...	200	....	....	....	200
	Waiehu	1,190	....	....	....	1,190
	Wailuku ...	4,935	....	....	....	4,935
	Waikapu ..	3,935	....	....	....	3,935
	Polipoli	....	....	42	42	42
		25,335	....	19,147	19,147	44,482
KULA No. 27 Proclaimed Sept. 11, 1912	Papaanui ..	....	....	370	370	370
	Kamaole ...	....	....	612	612	612
	Waiohuli-Keokea ..	....	....	2,450	2,450	2,450
	Kaonoulu ..	804	....	....	....	804
	Alae 1 and 2	202	....	....	....	202
	Alae 3 and 4	....	....	70	70	70
	Waiakoa ...	....	....	1,567	1,567	1,567
		1,006	....	5,069	5,069	6,075
WAIHOU SPRING No. 18 Proclaimed June 5, 1909	Makawao ..	....	....	74	74	74
	Makawao ..	10	....	....	....	10
		10	....	74	74	84
MAKAWAO No. 15 Proclaimed Apr. 21, 1908	Makawao ..	....	....	2,093	2,093	2,093

Island of Maui—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
KOOLAU No. 4 Proclaimed Aug. 24, 1905	*Opana, *Peahi, *Haiku	10,899	....	....	....	10,899
	*Halehaku	1,840	....	....	....	1,840
	Honopu-W.	....	....	....	....	....
	Makaiwa	....	....	4,800	4,800	4,800
	E. Makaiwa-Keopuka	....	....	1,400	1,400	1,400
	Honomanu	....	....	2,000	2,000	2,000
	Keanae, mauka	....	8,750†	....	8,750	8,750
	Wailua 1-2	....	1,280†	....	1,280	1,280
	Wailua-Ulaino	....	3,000†	....	3,000	3,000
	Wailua-Ulaino	....	....	9,000	9,000	9,000
		12,739	13,030	17,200	30,230	42,969
HANA No. 12 Proclaimed Nov. 30, 1906	Hana Forest	....	....	11,572	11,572	11,572
	W. Honomaele	187	....	....	....	187
	E. Honomaele	....	....	130	130	130
	Kawela-Kaeleku	....	....	65	65	65
	Wakiu	....	....	18	18	18
	Aleamai	357	....	....	....	357
	Haneoo	84	....	....	....	84
	Kakio	....	....	700	700	700
	Waiohonu	....	....	33	33	33
	Puukai-Papahawahawa	....	....	68	68	68
	Muolea	430	....	....	....	430
	Koali-Puuhaoa	....	....	600	600	600
	Wailua	....	....	270	270	270
	Puaaluu	....	....	311	311	311
		1,058	....	13,767	13,767	14,825
KIPAHULU No. 36 Proclaimed Aug. 20, 1914	Kaumakani-Papauluana	....	....	550	550	550
	Alaeiki	....	....	180	180	180
	Alaenui	5,705	....	....	....	5,705
	Kakahale-Kokoo	....	....	98	98	98
	Kukuiula	....	....	797	797	797
	Kukuiula (Grs.)	295	....	....	....	295
	Kaniaula	....	....	2,975	2,975	2,975
		6,000	....	4,600	4,600	10,600
Totals for Maui		46,148	13,030	61,950	74,980	121,128

*Surrendered to the custody of the Board of Agriculture and Forestry November 12, 1906, under the provisions of Sec. 490, R. L. H., 1915, for the period to February 26, 1923.

†Lease expires February 26, 1923.

Island of Hawaii.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
KOHALA MT. No. 31 Proclaimed Oct. 13, 1913	Awini	500	....	....	....	500
	Awini	....	....	100	100	100
	Honokane ..	5,410	....	....	....	5,410
	Pololu	....	....	1,000	1,000	1,000
	Makanikahio 1	64	....	....	....	64
	Makanikahio 2	71	....	....	....	71
	Waiapuka ..	197	....	....	....	197
	Niulii	560	....	....	....	560
	Makapala ..	530	....	....	....	530
	Aamakao ..	710	....	....	....	710
	Halawa	493	....	....	....	493
	Halelua	15	....	....	....	15
	Nunulu	38	....	....	....	38
	Lamaloloa-Kaiholena	140	....	....	....	140
	Lamaloloa .	....	....	24	24	24
	Kawaihae I.	....	....	3,370	3,370	3,370
	Kawaihae II.	120	....	....	....	120
	Puukawai-wai-Panoluukia-Kapia	....	....	360	360	360
	Pauahi	....	....	150	150	150
	Momoualoa .	....	....	130	130	130
	Ouli	190	....	....	....	190
	Lanikepu ..	25	....	....	....	25
	Lanikepu ..	....	....	435	435	435
	Waikoloa ..	250	....	....	....	250
	Puukapu ...	....	....	8,385	8,385	8,385
	Waipio	3,560	....	....	....	3,560
	Lalakea	1,540	....	....	....	1,540
	Kukuihaele .	10	....	....	....	10
	Waikoekoe .	1,000	....	....	....	1,000
	Kamoku ...	....	20[1]	....	20	20
	Keaa	....	230[1]	....	230	230
		15,423	250	13,954	14,204	29,627
HAMAKUA-PALI No. 2 Proclaimed Dec. 23, 1904	Muliwai ...	....	....	3,575	3,575	3,575
	Waimanu and Laupahoehoe 1 .	....	....	4,943	4,943	4,943
	Waimanu kuleanas .	61	....	....	....	61
	Waimanu homesteads	196	....	....	....	196
	Waimanu ..	....	200[2]	....	200	200
	Laupahoehoe 2	2,350	....	....	....	2,350
	Nakooka ...	....	....	1,640	1,640	1,640
	Apua	....	....	1,260	1,260	1,260
	Waikapu ...	....	....	1,980	1,980	1,980
	Honopue ...	....	....	2,220	2,220	2,220
	Awini	....	....	515	515	515
		2,607	200	16,133	16,333	18,940

Island of Hawaii—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
HAUOLA No. 22 Proclaimed June 13, 1910	Hauola	....	....	7	7	7
MAUNA KEA No. 17 June 5, 1909	Kaohe	....	....	66,600	66,600	66,600
HILO No. 3 Proclaimed July 24, 1905	Humuula ...	....	....	3,901	3,901	3,901
	Kahoahuna .	....	....	46	46	46
	Waipunalei .	1,470	....	....	....	1,470
	Laupahoehoe Weloka ..	....	....	11,845	11,845	11,845
	Maulua	7,989	....	....	....	7,989
	Waikumalo-Maulua ..	....	....	790	790	790
	Piha	....	....	3,780	3,780	3,780
	Nanue	145	....	....	....	145
	Honohina ..	5,555	....	....	....	5,555
	Opea-Peleau	....	....	230	230	230
	Umauma ...	1,561	....	....	....	1,561
	Kamaee-Wailua ...	....	....	930	930	930
	Hakalau ...	9,826	....	....	....	9,826
	Wailea-Kaiwiki .	....	....	3,834	3,834	3,834
	Honomu-Kuhua ...	....	....	926	926	926
	Makahanaloa	3,949	....	....	....	3,949
	Onomea	773	....	....	....	773
	Kahalii	183	....	....	....	183
	Papaikou ...	10,269	....	....	....	10,269
	Pahoehoe ..	176	....	....	....	176
	Paukaa	6,221	....	....	....	6,221
	Kikala	90	....	....	....	90
	Kalalau ...	918	....	....	....	918
	Puueo	436	....	....	....	436
	Piihonua ...	....	33,941[3]	....	33,941	33,941
	Punahoa ...	216	....	....	....	216
		49,777	33,941	26,282	60,223	110,000
UPPER WAIAKEA No. 32 Proclaimed Oct. 13, 1913	Piihonua ..	....	3,800[3]	....	3,800	3,800
	Waiakea ...	....	....	51,200	51,200	51,200
			3,800	51,200	55,000	55,000
PANAEWA No. 40 Proclaimed Apr. 11, 1917	Waiakea ...	....	....	1,750	1,750	1,750
OLAA No. 48 Proclaimed Dec. 31, 1918	Olaa	....	....	11,061	11,061	11,061
	Olaa	....	8,589[4]	....	8,589	8,589
	Olaa	....	99[5]	....	99	99
	Olaa	....	100[5]	....	100	100
	Olaa	....	98[6]	....	98	98
		....	8,886	11,061	19,947	19,947

Island of Hawaii—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
UPPER OLAA No. 33 Proclaimed Oct. 13, 1913	Olaa	....	....	9,280	9,280	9,280
OLAA FOREST PARK No. 37 Proclaimed Aug. 20, 1914	Olaa	....	....	532	532	532
PUNA No. 25 Proclaimed June 29, 1911	Makuu-Kaohe ...	....	....	18,350	18,350	18,350
	Kaimu-Kehena	....	....	1,500	1,500	1,500
	Kapaahu-Kamaili					
		....	....	19,850	19,850	19,850
KEAUOHANA No. 43 Proclaimed June 19, 1918	Keauohana .	....	....	272	272	272
KAU No. 9 Proclaimed Aug. 2, 1906	Puumakaa-Kiolakaa .	....	5,750[7]	....	5,750	5,750
	Waiohinu ..	....	....	10,740	10,740	10,740
	Kahilipalinui	165	....	....	....	165
	Kawala-Kaunamano.	....	....	380	380	380
	Kioloku	....	....	216	216	216
	Hionaa-Hokukano-mauka	....	....	345	345	345
	Kaalaiki ...	....	....	10,705	10,705	10,705
	Hilea-nui ..	2,620	....	....	....	2,620
	Hilea-iki ...	37	....	....	....	37
	Ninole-Wailau ..	....	....	.6,140	6,140	6,140
	Punaluu	1,275	....	....	....	1,275
	Mohokea 1-2	....	....	1,876	1,876	1,876
	Moaula-Kopu-Makaka ..	....	....	7,382	7,382	7,382
	Moaula-Kopu-Makaka ..	....	46[8]	....	46	46
	Paauau	1,675	....	....	....	1,675
	Kaauhuhuula	....	....	3,009	3,009	3,009
	Kuaiwa	483	....	....	....	483
	Kaalaala-Makakupu	....	....	7,204	7,204	7,204
	Kapapala ..	....	....	7,046	7,046	7,046
		6,255	5,796	55,043	60,839	67,094

Island of Hawaii—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
SOUTH KONA No. 24 Proclaimed May 17, 1911	Kaohe	....	....	1,555	1,555	1,555
	Kaohe 4	760	....	....	....	760
	Kukuiopae .	....	....	2,760	2,760	2,760
	Olelomoana 1	810	....	....	....	810
	Olelomoana-Opihihali .	....	2,400[9]	1,485	3,885	3,885
	Kipahoehoe.	....	....	4,590	4,590	4,590
	Honomalino.	....	....	2,540	2,540	2,540
	Kapua	6,122	....	....	....	6,122
	Kaulana-mauna ...	....	....	2,060	2,060	2,060
	Manuka ...	....	....	11,870	11,870	11,870
		7,692	2,400	26,860	29,260	36,952
HONUAULA No. 8 Proclaimed Apr. 4, 1906	Honuaula ..	....	....	665	665	665
WAIAHA SPRING No. 16 Proclaimed Apr. 21, 1908	Waiaha 2 ..	....	....	193	193	193
Totals for Hawaii		81,754	55,273	299,682	354,955	436,709

[1]Lease expires September 8, 1928.
[2]Lease expires November 22, 1922.
[3]Lease expires March 21, 1921.
[4]Lease expires February 5, 1932.
[5]Lease expires May 9, 1932.
[6]Lease expires November 22, 1932.
[7]Lease expires May 24, 1923.
[8]Lease expires June 16, 1921.
[9]Lease expires June 9, 1926.

SUMMARY.

Island	No. of Reserves	Private Land, Acres	Leased Government Land, Acres	Unleased Government Land, Acres	Total Government Land, Acres	Total All Lands, Acres
Kauai	8	66,574	9,097	70,999	80,096	146,670
Oahu	15	33,888	....	34,045	34,045	67,933
Molokai ...	1	31,406	9,136	4,132	13,268	44,674
Maui	7	46,148	13,030	61,950	74,980	121,128
Hawaii	16	81,754	55,273	299,682	354,955	436,709
Totals ...	47	259,770	86,536	470,808	557,344	817,114

REPORT OF THE FOREST NURSERYMAN

Honolulu, Hawaii, December 31, 1920.

Superintendent of Forestry,
Honolulu, Hawaii.

Dear Sir: I respectfully submit the following report for the calendar years 1919 and 1920:

COLLECTION AND EXCHANGE OF SEED.

The collecting of seed has been continued with the aid of two boys. A number of trees raised from seed received through our exchange system and from individuals are now bearing. A plentiful supply of seed of the following species can be collected: *Juniperus bermudiana,* introduced by Mr. Gerrit P. Wilder, *Juniperus australis,* received through our exchange system from Jamaica, and the African tulip tree, *Spathodea campanulata,* the seed of which was received by Mr. C. S. Judd from Madagascar in 1916. From two pods we were able to propagate 2,000 seedlings which were distributed to people all over the islands. The first trees of this species which we have noticed bearing seed were found during August, 1920, at different localities in the Makiki District, University of Hawaii grounds and at other places in and around the city. The Australian red cedar, *Cedrela australis,* introduced by Mr. E. C. Smith in 1914, seeded during 1919 for the first time. Other trees of recent introduction may also be found bearing seed.

TREES DISTRIBUTED FROM GOVERNMENT NURSERIES DURING 1919 AND 1920.

Oahu: 1919.

Makiki and King St. Nurseries:

	Seedlings	Transplants	Pot Grown	Total
Sold	1,000	450	1,732	3,182
Gratis				
Arbor Day	....	....	6,392	6,392
Forest Reserves	17,900	3,260	6,031	27,191
Homesteaders	3,000	1,300	4	4,304
Military Posts	19,200	5,913	2,093	27,206
Parks	....	....	52	52
Schools	....	....	80	80
Street Planting	....	....	949	949
Miscellaneous	24,000	9,000	3,084	36,084
	65,100	19,923	20,417	105,440

	Seedlings	Transplants	Pot Grown	Total
Kauai:				
Kalaheo Nursery, Including Arbor Day	....	....	3,602	3,602
Maui:				
Haiku Nursery, including Arbor Day	40,500	....	....	40,500
Hawaii:				
Hilo Nursery, including Arbor Day	....	6,303	6,000	12,303
	105,600	26,226	30,019	161,845
Plantation Companies, Etc.	103,000	16,300	10,936	130,236
Totals	208,600	42,526	40,955	292,081

1920.

Oahu:

Makiki and King St. Nurseries:

Sold	....	700	1,336	2,036
Gratis				
Arbor Day	....	....	4,370	4,370
Forest Reserves	31,200	9,816	5,209	46,225
Homesteaders	....	100	340	440
Military Posts	4,000	3,200	2,803	10,003
Schools	141	....	....	141
Street Planting	....	412	....	412
Miscellaneous	....	2,005	2,550	4,555
	35,341	16,233	16,608	68,182
Kauai:				
Kalaheo Nursery, including Arbor Day	....	....	7,896	7,896
Maui:				
Haiku Nursery, including Arbor Day	11,100	10,330	1,163	22,593
Hawaii:				
Hilo Nursery, including Arbor Day	500	1,113	6,234	7,847
	46,941	27,676	31,901	106,518
Plantation Companies, Etc.	114,600	2,550	298	117,448
Totals	161,541	30,226	32,199	223,966

Total Tree Distribution 1919 and 1920.....516,047

Government Realizations.

Turned into the Treasury.

1919.

Sale of Plants	$ 67.60
Rent of Office, Nursery Grounds	455.00
Rebate on Drugs Returned	123.33
Price of Magazine Returned	3.00
Two Days' Labor not Performed (Haiku)	3.23
Total	$ 652.16

1920.

Sale of Plants, Government Nursery	$ 35.80
Sale of Plants, Kalaheo Nursery, Kauai	98.25
Rent of Office, Nursery Grounds	420.00
Total	$ 554.05

Special Funds.

Preservation and Extension of Forestry and Forest Reserves.

1919.

Rents and Fees	$ 156.00
Sale of Black Sand, Makiki, Oahu	178.50
Sale of Cord Wood, Olaa, Hawaii	154.25
Sale of Charcoal, Tantalus, Oahu	114.75
Kokee Camps, Kauai—Fees	305.61
Total	$ 909.11

1920.

Rents and Fees	$ 212.50
Sale of Black Sand, Makiki, Oahu	297.50
Sale of Charcoal, Tantalus, Oahu	8.92
Kokee Camps, Kauai—Fees	489.08
Total	$1,008.00

Animal Industry Revolving Fund.

To Sale of Vaccines, 1919	$ 448.25
To Sale of Vaccines, 1920	1,645.35

PLANTATION COMPANIES AND OTHER CORPORATIONS, ETC.

The number of trees distributed to plantation companies and other corporations during 1919 and 1920 amounted to 247,684, as follows:

	1919.				1920.			
	Seedlings	Transplants	Pot Grown	Total	Seedlings	Transplants	Pot-Grown	Total
Eucalyptus resinifera	5,500	.....	.....	5,500	25,000	.....	.....	25,000
" crebra	4,500	.....	.....	4,500	.....	.....	.....	.....
" pilularis	15,000	.....	.....	15,000	11,800	.....	.....	11,800
" citriodora	10,000	.....	.....	10,000	7,000	.....	.....	7,000
" globulus	12,000	.....	.....	12,000	20,000	.....	.....	20,000
" robusta	45,000	.....	.....	45,000	29,000	.....	.....	29,000
" rostrata	16,000	.....	.....	16,000	5,400	.....	.....	5,400
" rudis	10,000	.....	.....	10,000	2,000	.....	.....	2,000
Catalpa sps.	.....	.....	.....	.....	4,400	.....	.....	4,400
Cedrela australis	.....	.....	36	36	10,000	.....	.....	10,000
Casuarina equisetifolia	.....	.....	.....	.....	.....	2,550	298	2,848
Ficus religiosa	1,000	.....	.....	1,000	.....	.....	.....	.....
Cryptomeria japonica	10,000	.....	1,200	11,200	.....	.....	.....	.....
Totals	129,000	.....	1,236	130,236	114,600	2,550	298	117,448

Total for two years—247,684

MAKIKI STATION.

The regular work at the Makiki station consisted of mixing and sterilizing soil, transplanting seedlings, propagating by cuttings, sawing up wood for seed and transplant boxes, etc.

The proposed arboretum which is to be located in and will eventually occupy the whole of upper Makiki and Hering Valleys is certainly a step in the right direction. A good collection of trees, shrubs and vines are to be found already in and around the station and will form the nucleus of the arboretum. When the whole of both valleys are occupied with different kinds of trees properly tagged with their common and scientific names, the collection will not only be of interest and benefit to arboriculturists but also to many visitors who are always anxious to learn the names and history of the trees to be found growing in these islands.

HONOLULU WATERSHED.

The work on the watershed consisted of clearing and extending trails, rooting out pests, planting trees and assisting at Makiki station during bad weather. As most of the land being planted consists of rocky and precipitous patches, the work of reforestation is consequently slow. This land, however, is not suitable for anything else and the clothing of every available spot with trees adds to the cover on the watershed and should in time assist in the preservation and probable increase of our much needed water supply. The number of trees planted on the watershed during the past two years was 4,416 in 1919 and 3,502 in 1920 or a total of 7,918 trees. These consisted of koa, mahogany and Australian red cedar.

SUB-NURSERIES.

It became necessary to enlarge and better equip our sub-nurseries on the other islands, after the passage of Rule XX of the Division of Plant Inspection, forbidding the shipping of trees from Oahu to any of the other islands with soil about their roots. The object of this rule is a precaution against the transportation of insect pests and diseases liable to be introduced from foreign countries. Honolulu being the principal port of entry for vessels trading with other countries makes Oahu more liable than any of the other islands to be first infested.

HILO SUB-NURSERY.

The writer made two trips to Hilo for the purpose of assisting in the starting of a new nursery large enough to supply the

island of Hawaii with all kinds of trees and other plants desired. Consequently the nursery was moved from the Catholic Mission School to the Animal Quarantine Station, two miles out from the center of Hilo. This nursery has been in charge of Brother Matthias Newell for a number of years as shall also the new nursery at the Animal Quarantine Station. A good start has been made at the new nursery. A potting shed and small office has been built, water has been laid on the ground and tables and benches for holding seedlings, transplants and pot-grown plants have been installed. Supplies of different kinds of seeds suitable for the demand have been forwarded from time to time from Honolulu; also a quantity of plants packed and shipped in moss. The new nursery will be in good running order in a short time now and the whole island can be supplied from this nursery.

We appreciate very much the kind assistance rendered by Dr. H. B. Elliot, who has done everything in his power to help the work along. We are therefore indebted to him for such courtesies and help as he has rendered in making the establishment of this new nursery a success.

MAUI SUB-NURSERY.

The writer made two visits to Maui for the purpose of assisting in the starting of a nursery to supply Maui and Molokai with trees.

Mr. James Lindsay, Forest Ranger, was appointed to take charge of the nursery which is located at his residence at Haiku. Additional equipment had to be installed, a new potting shed and stands and benches built, water laid on and general tools for operating the work supplied.

This nursery is now in very good running order and has a large supply of many species on hand for distribution.

KAUAI SUB-NURSERY.

The nursery at Kalaheo, in charge of Joe Rita, Jr., has not been visited by the writer since the new law took effect, but a visit is contemplated in the near future. Seeds have been supplied at intervals and we expect to give him additional equipment so as to increase the output of this nursery.

ADVICE AND ASSISTANCE.

The writer has been called upon to make a large number of visits and give advice on tree planting and other subjects by people living in and around the city. All the different military posts on Oahu have been visited a number of times at the request

of the officers for advice on the planting and improvement of their respective posts.

NURSERY GROUNDS.

The parking around the offices and the park part of the grounds has been kept in order by two men, with assistance occasionally from an additional man at odd times who is generally employed doing such work as attending to the fixing of pipes, doing rough carpenter work, etc., both at the Government Nursery on King Street and at the Makiki Nursery.

YEARBOOKS AND VEGETABLE SEED.

From our delegate in Congress we have received the usual consignments of U. S. Department of Agriculture yearbooks and vegetable seeds. These have been distributed throughout the Territory and have been much appreciated by recipients. A large supply of fresh seed is now on hand as well as back numbers of the yearbook which we will be glad to send out to applicants.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

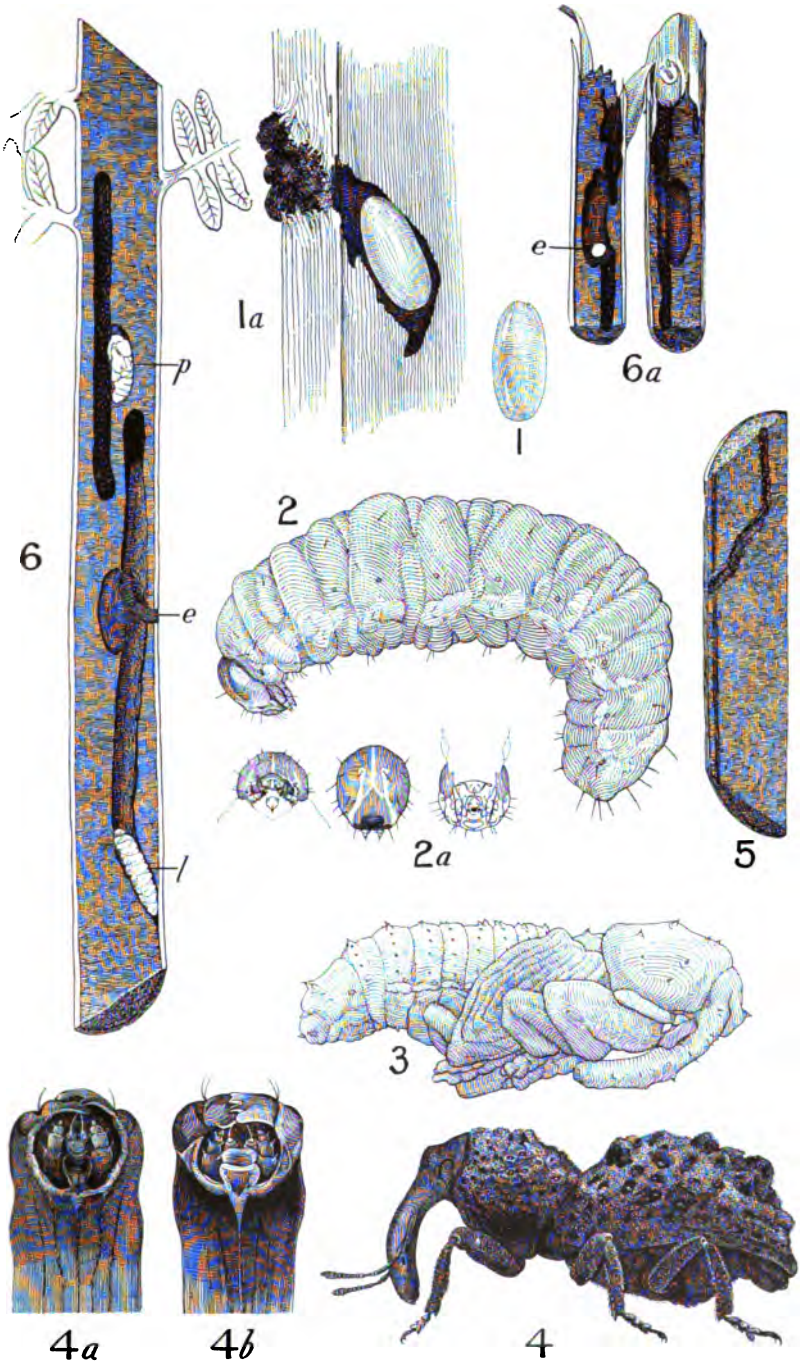


Plate XIII.—Legend.

The Fern Weevil (**Syagrius fulvitarsis** Pasc.)—1, egg (greatly enlarged); 1a, section of fern stem showing egg-chamber (greatly enlarged). 2, larva; 2a, head of larva from front, above, and beneath, showing mouth parts (x10). 3, pupa (x10). 4, adult weevil (x10); 4a, b, apical extremity of rostrum showing mouth parts (greatly enlarged). 5, section of fern stem showing gallery of freshly-hatched larva (somewhat enlarged). 6, section of fern stem showing galleries of more advanced larvae and pupal chamber with exit; *l*, larva; *p*, pupa; *e*, exit (somewhat enlarged); 6a, portion of the preceding in greater detail.

Division of Entomology

REPORT OF THE ENTOMOLOGIST

Honolulu, Hawaii, December 8, 1920.

Board of Commissioners of Agriculture and
Forestry, Territory of Hawaii.

Gentlemen: I submit herewith my report for the biennial period January 1st, 1919, to December 31st, 1920:

The activities of the Division of Entomology during the biennial period ended December 31, 1920, have been largely directed along practical lines, aiming to meet the demand for relief from insect depredations. A great deal of time, however, has been given to investigation, and the most pressing problems of insect control have been thoroughly studied.

The propagation and distribution of beneficial insects, particularly fruit-fly, horn-fly and corn leaf-hopper parasites, have been continued throughout the period. A tabulation of the data in connection with this work is appended.

The acclimitization and establishment in the islands of *Pteromalus puparum,* an important pupal parasite of one of the destruction cabbage insects *Pieris rapae* (cabbage worm, imported cabbage butterfly) was again tried. A small consignment of the parasite was received through the cooperation of the California State Horticultural Commission in June, 1919, and instead of liberating the parasites at once as had been done on previous occasions, they were held for multiplication by rearing in confinement. It has thus been possible to liberate large numbers of individuals at frequent intervals of time and in many different localities. A tabulation of the data in connection with this work is also appended. To date the parasite has not been recovered in the field, but its ultimate establishment is confidently expected. Assurance of the establishment of several earlier introductions, notably the cockroach parasite, *Dolichurus stantoni,* has been gained during the biennial period.

In September, 1919, an infestation of the forest ferns by the Australian Fern Weevil, *Syagrius fulvitarsis,* was discovered at 29 Miles from Hilo on the Hilo-Kau Road. On account of the wealth of fern growth in this region and the importance of the ferns as part of the ground cover in the nearby forest reserves, it was decided to attempt to control the outbreak and prevent the

spread of the weevil beyond the confines of the small area in which it was determined to be present. This necessitated the destruction of all ferns in the area as far as possible, which were cut and burned. Thereafter the ground cover was either fired or poisoned as far as possible to destroy crawling weevils which might have escaped the initial treatment, and to remove the last vestige of subsistence for the weevils. An artificial barrier of crude oil was also laid on the outer edge of the infestation, to contain the insect. Unfortunately the work was hampered by property holders in the infested area, who found the drastic requirements of the eradication work very burdensome. Delays for this and other reasons led to the involvement of such a large territory that the cost of clearing seemed to go beyond reasonable limits, and the work was terminated without the achievement of a complete eradication, although at the time of abandonment success seemed probable and easily within reach.

On account of unsettled conditions abroad and poor transportation facilities no field work was undertaken until the latter part of 1920, when the failure of artificial control measures applied to the fern weevil turned the minds of those interested in the direction of natural or biological control, and in September steps were taken to employ an entomologist in Australia to investigate the biology of the fern weevil with respect to its natural enemies. At about the same time a cooperative arrangement was made with the H. S. P. A. Experiment Station for the development of several projects which had been under consideration for a long time, namely, the introduction of parasites of the bean pod borer *Lycaena boetica*, the improvement of dung fly control, and the introduction of the insects producing fertile seeds in trees of the genus *Ficus* which are desirable for purposes of reforestation.

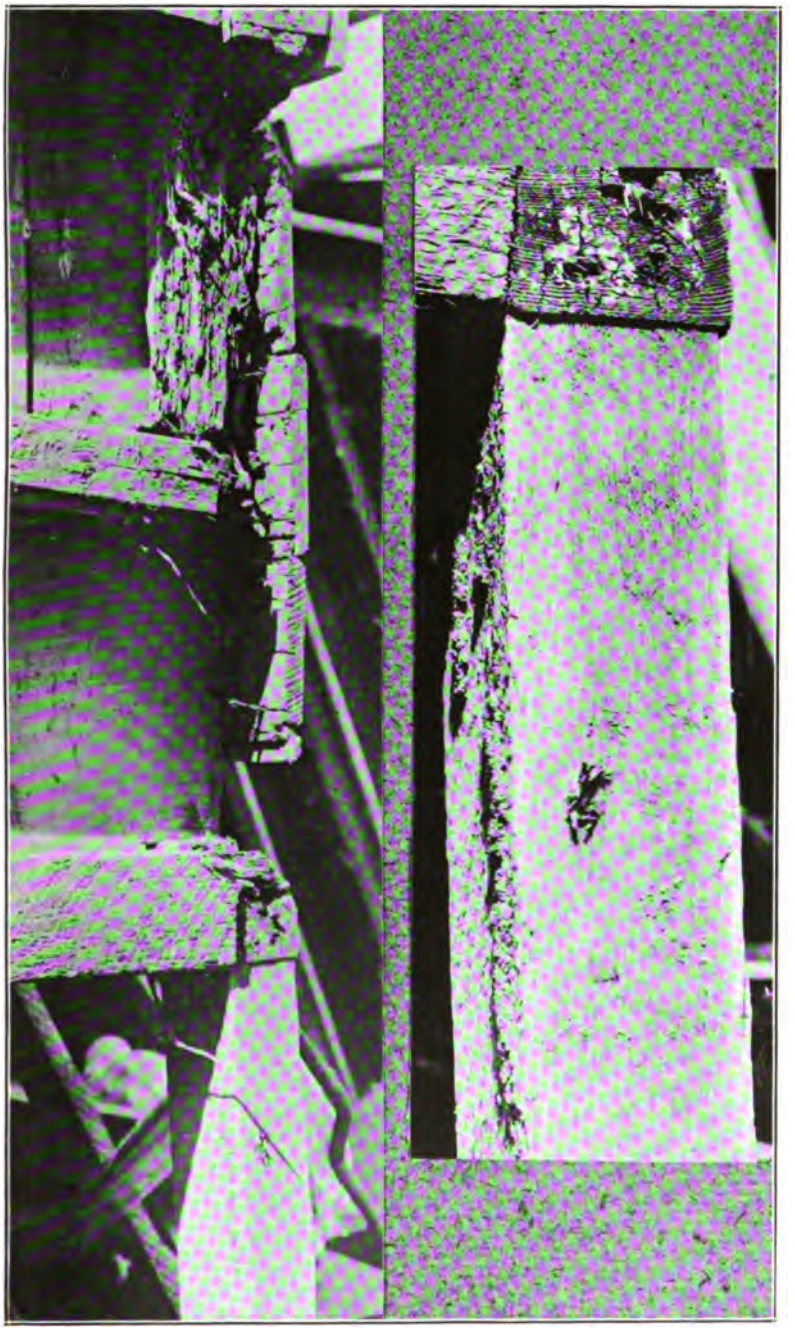
Two important investigations have been carried on during 1920 the results of which are about to be published. In connection with the control of the fern weevil a thorough study was made of its history, habits, cyclical development, etc., which had not previously been done, although the weevil has been known in the islands fifteen years. Later the termites, or white ants, which damage wood, woodwork and wood products were given consideration.

The regular routine of advising in regard to agricultural and stock pests, maintenance of collections and classificatory work on the same, has also been attended to. The following publications have been made:

Natural Control of Scale Insects in Hawaii:
—P. H. E. S. V. IV (2), June, 1920. (pp. 237-246).

New Genera and Species of Braconidae, Mostly Malayan:
—Jour. Straits Branch R. A. Soc., No. 80, 1919. (pp.39-59, 1 pl.)

Plate XIV.



Work of the white ant, **Coptotermes intrudens** Oshima. Runway constructed on supporting timber and leading from underground nest to framework of dwelling-house in Honolulu. (Reduced.)

Control of the Melon Fly in Hawaii by a Parasite Introduced from India:
—Rpt. of the Proc. of the Third Ent. Meeting held at Pusa, India, Feb. 1918. Reprinted Haw. For. and Agr., Vol. XVII (4), April, 1920. (pp. 101-105).

The Fern Weevil Menace:
—Haw. For. and Agr., Vol. XVII (1), p. 3-4, 1 pl., Jan., 1920.

The Horn-Fly Problem:
—Haw. For. and Agr., XVII (6), June, 1920. (pp. 166-167).

Termites, or White Ants, in Hawaii:
—Haw. For. and Agr., Vol. XVII (10), Oct., 1920. (pp. 294-301, 10 pls).

The Fern Weevil (*Syagrius fulvitarsis*):
—In course of preparation.

Respectfully submitted,

DAVID T. FULLAWAY,
Entomologist.

TABULATION SHOWING THE LIBERATION OF BENEFICIAL INSECTS, 1919-1920.

	Oahu	Kauai	Molokai	Maui	Hawaii	Total
FRUIT FLY PARASITES.*						
Galesus silvestri	18,830	....	....	....	....	18,830
Diachasma tryoni	18,270	650	....	2,200	855	21,975
Tetrastichus giffardianus	38,275	500	....	3,050	2,100	43,925
Dirhinus giffardi	9,990	....	....	....	....	9,990
Opius humilis	8,110	....	....	790	....	8,900
Diachasma fullawayi	6,345	200	....	1,460	50	8,055
Totals	99,820	1,350	....	7,500	3,005	111,675
MELON FLY PARASITE.†						
Opius fletcheri	82,910	650	400	450	8,150	92,560
CORN LEAF HOPPER PARASITE.‡						
Paranagrus osborni	88,100	33,100	7,000	2,000	29,500	159,700
DUNG FLY PARASITES.§						
Spalangia cameroni	11,550	....	....	2,350	....	13,900
Pachycrepoideus dubius.	150	....	....	....	....	150
Totals	11,700	....	....	2,350	....	14,050

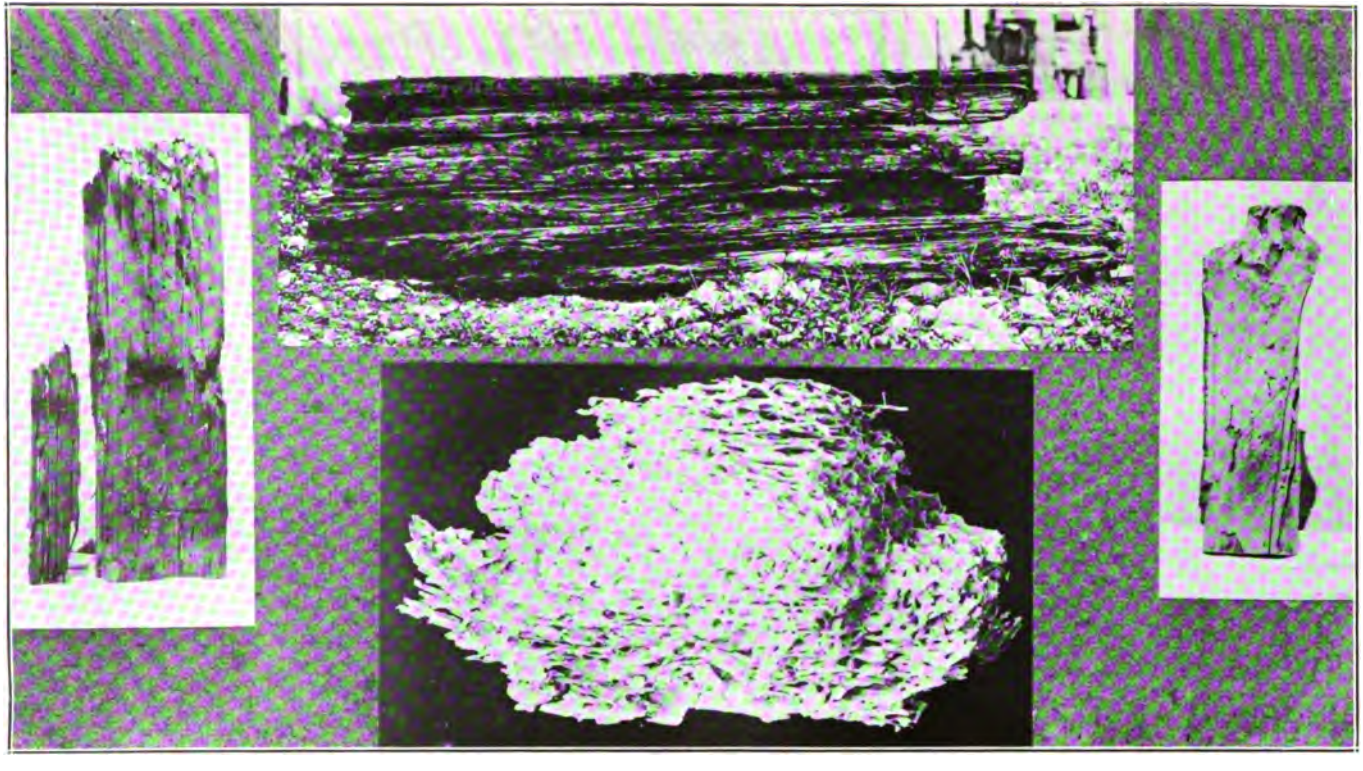
*Liberated at:
Oahu: Nuuanu, Kaimuki, Moanalua, Waipahu, Makiki, Kalihi, Pearl Harbor, Pupukea, Wyllie Street, Manoa, Wahiawa, Waikiki, Palama.
Hawaii: Kohala, Kamuela, Honokaa, Hilo, Pepeekeo, Hawi.
Maui: Wailuku, Paia, Kula, Makawao.
Kauai: Kalaheo, Kealia.

†Liberated at:
Oahu: Moiliili, Manoa, Lualualei, Makiki, Kaaawa, Ft. Kamehameha, Wahiawa, Kailua, Pearl Harbor, Maunawai, Pupukea, Nuuanu, Kalihi, Waialua, Moanalua, Waipahu, Kaneohe, Waianae.
Hawaii: Hilo, Kamuela, Pepeekeo, Glenwood, Kapoho, Paauilo, Keaau.
Maui: Wailuku, Makawao.
Kauai: Kealia.

‡Liberated at:
Oahu: Makiki Nursery, Kalihi, Manoa, Wahiawa, Kailua, Schofield Barracks, Kaneohe.
Hawaii: Kohala, Hawi, Kamuela.
Kauai: Lihue, Kealia, Kilauea.
Maui: Kula.
Molokai: Pukoo.

§Liberated at:
Oahu: Wahiawa, Maunawai, Moanalua, Pearl Harbor.
Hawaii: Volcano House, Keaau.
Maui: Paia.

Plate XV.



Work of the three lowland species of white ants or termintes in Hawaii. Center—**Coptotermes intrudens** Oshima, damaged railroad sleepers, above; interior of damaged timber, below. Left—**Kalotermes sp.** referred to **marginipennis**—damaged timber. Right—**Cryptotermes sp.** referred to **brevis**—damaged wood sample. (Reduced.)

TABULATION SHOWING REARING, LIBERATION AND DISTRIBUTION OF PTEROMALUS PUPARIUM, PUPAL PARASITE OF THE CABBAGE BUTTERFLY, PIERIS RAPAE.

1919-1920.

Month	Pupae	Emergence	Liberation
1919—			
June	27	.....	.....
July	112	989	679
August	176	3,610	1,200
September	372	7,353	5,800
October	524	10,740	8,300
November	981	20,286	19,900
December	549	18,458	16,400
Total	2,741	61,436	52,279
1920—			
January	518	7,292	6,300
February	610	20,436	18,700
March	568	27,195	26,150
April	364	9,875	10,200
May	287	10,112	99,100
June	38	347	250
July	89	2,277	1,800
August	232	7,865	6,050
September	319	8,870	8,100
October	362	11,760	11,200
November	253	5,615	5,500
December	216	3,340	4,000
Total	3,856	114,984	107,350

Liberated at the following localities:

Oahu: Wahiawa, Makiki, Moiliili, Koko Head, Waikiki, Kalihi, Moanaiua, Pearl City, Nuuanu, Punahou.

Hawaii: Kamuela, Kealakekua, Hilo.

Molokai: Kalaupapa.

Division of Plant Inspection

REPORT OF THE CHIEF PLANT INSPECTOR

Honolulu, Hawaii, December 31, 1920.

Board of Commissioners of Agriculture
and Forestry, Honolulu, Hawaii.

Gentlemen: I submit herewith my biennial report as Chief Plant Inspector of the Division of Plant Inspection for the period from January 1, 1919, to December 31, 1920.

The principal work of the Division during the above period consisted of the inspection of all fruits, vegetables, plants and seeds arriving in this Territory from foreign countries and the mainland of the United States in order to prevent the introduction of serious pests and plant diseases not now existing in Hawaii, but which are on record as being a menace to the agricultural industries in other countries.

Another phase of our work consists of the inspection of all fruits, vegetables, plants and seeds that are in Inter-Island traffic from Oahu to all the other islands for the purpose of preventing the spread to any other island of any pest or plant disease accidentally introduced on Oahu through the Port of Honolulu, which is, practically speaking, the only port of entry for all horticultural products from foreign countries, excepting rice and bean shipments which are also shipped to Hilo direct from Japan, but are under personal supervision at all times.

Besides the important work cited above we are undertaking the identification, tabulation, preservation, and mounting of pests and plant diseases taken in inspection, and the acquiring by exchange of specimens of serious pests occurring in foreign countries and the mainland of the United States, together with samples of the nature of their damage, which is of inestimable value to those who are to be on the watch for such pests. These collections in time to come will be of the greatest value to the expert as well as to the student of entomology, also to the building up of a reference library of plant pests and diseases recorded in all countries of the world.

DIVISION STAFF.

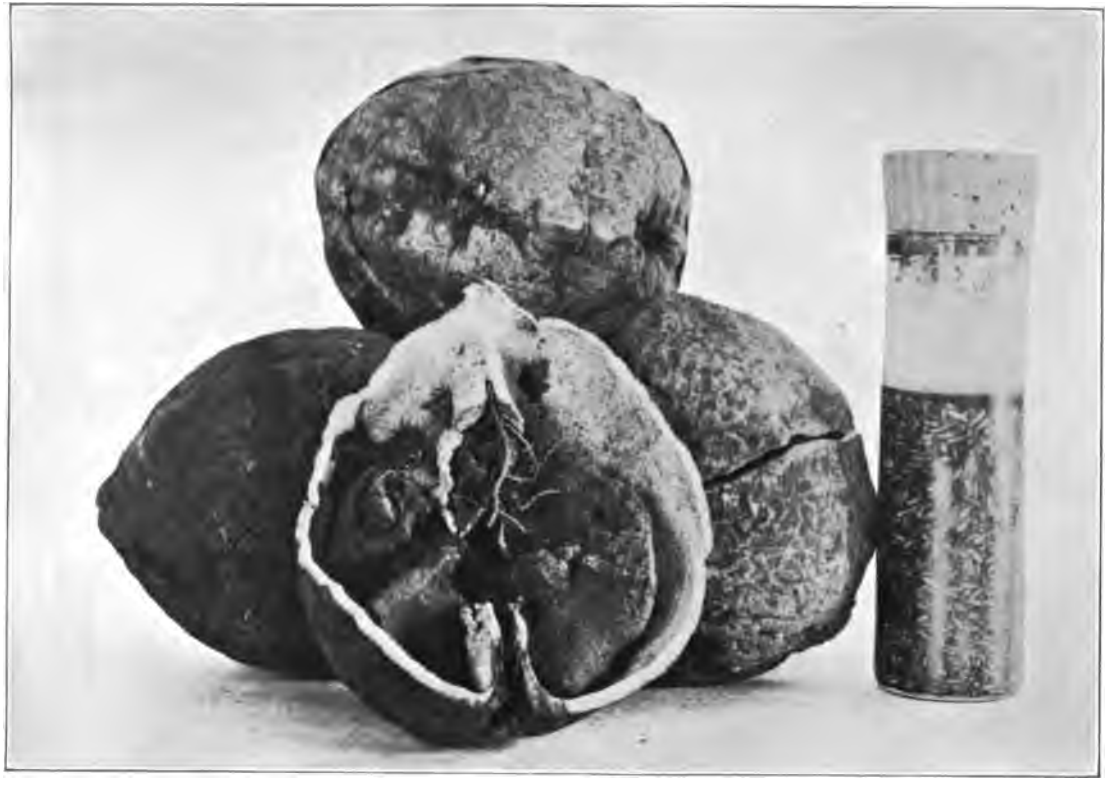
Edw. M. Ehrhorn ..... Chief Plant Inspector

D. B. Langford§* .....Assistant Plant Inspector
L. A. Whitney= .....Assistant Plant Inspector and Lab. Asst.
Edward Drew† .....Inspector's Assistant
Isaac Kahele Joshua .....Inspector's Assistant
Minoru Mito ..'.....Inspector's Assistant in Laboratory
Ruth L. Seybolt .....'..'.....Inspector's Clerk
Bro. M. Newell .....Plant Inspector at Hilo, Hawaii
Will J. Cooper‡ .....Plant Inspector at Kahului, Maui
Louis Gillin# .....Plant Inspector at Kahului, Maui
E. E. Madden .....Honorary Inspector at Mahukona, Hawaii
Geo. B. Leavitt .....Honorary Inspector at Eleele, Kauai
G. C. Munro .....Honorary Inspector at Manele, Lanai

§On leave for one year, Aug. 1919 to Aug. 1920. =Appointed June 15, 1920. *Resigned Oct. 10, 1920. †Resigned Dec. 15, 1920. ‡Resigned Aug. 31, 1920. #Beginning Sept. 1, 1920.

BUILDINGS AND EQUIPMENT.

The last legislature set aside $9,500 out of the loan fund for further additions and equipment at the Honolulu station as well as for a fumigating unit and office at Hilo, Hawaii. This money became available in the first allotment made by the Governor. The necessary plans and specifications were approved by the Commissioners of Agriculture and Forestry and a new addition to the present fumigation building has been erected. It is our intention to install a vacuum fumigator in this building and also use the room for a quarantine laboratory. By means of the vacuum fumigator all small packages of seeds, herbs, and other horticultural products arriving by mail or express from the mainland, but especially from foreign countries, will be treated with gases under vacuum and all risk of not killing the eggs and larvae of injurious insect pests present will then be overcome. The most successful results have been obtained in various sections of the country by the use of vacuum fumigators. Many packing houses on the Pacific Coast are building these for treating various commodities already packed in cartons, such as dried dates, figs, cereals, etc., which become infested in a short period, owing to the fact that eggs were deposited on the unpacked material while in bulk in the warehouse. The fumes or gases used for the work are able to penetrate all packages on account of the vacuum created by pumping out the air of the container, the gas in turn being sucked into every crevice when introduced. Vacuum fumigation is a time-saver. Under ordinary methods from 24 to 48 hours are required to subject materials to fumes of carbon bisulphide, all depending on the density of the same; under the vacuum process from one to two hours is sufficient time.



(Photo, Div. of Plant Insp. Original.)

Large tree seeds from Java showing empty nest of termite (white ant). Vial containing part of termite colony showing soldiers and workers.

A small quarantine greenhouse has been erected on the premises to be used for certain plant shipments which it is found will not carry in moss. These plants will be repotted in sterilized soil and held for the necessary period to reestablish themselves before shipment to the other islands, thus avoiding the danger of carrying insect pests and disease germs which the original soil might contain.

The building at Hilo has not as yet been started although the plans are ready. This is on account of not being able to settle definitely on the most convenient location near the shipping center. However, in the early part of 1921, we hope that work on the building will be started so as to complete the structure before June 30. Ever since the T. K. K. Steamship line established direct communication between Japan and Hilo, we have been on the anxious seat lest some serious pest should be introduced in rice and bean shipments landed at Hilo. Fortunately all these shipments are fumigated at Kobe under Government supervision and the necessary certificates issued, yet owing to the varied cargo which these vessels carry, especially rice and beans which have not been treated, there is always a chance for infestation on board ship—therefore the motto "safety first" warrants the erection of this building.

INSPECTION OF FRUIT AND PLANT SHIPMENTS.

During the period from January 1, 1919, to December 31, 1920, 1,748 vessels arriving at the Ports of Honolulu, Hilo and Kahului were boarded and of this number 623 vessels carried vegetable matter subject to inspection, consisting of 579,207 packages. Of this number 563,289 packages were fruits and vegetables, the bulk of which arrived from the mainland of the United States and were imported for local consumption. Owing to the thorough methods of insect control and the standardization of market produce in the Pacific Coast States, a very small percentage of these shipments is found infested and a very few of inferior quality. A total of 10,812 packages contained plants, all of which were hauled to the plant room of the Division and were carefully examined for the various known pests of record which might be found on them. A total of 5,119 packages of tree, flower, field and vegetable seeds, the bulk of which arrived by mail, were thoroughly gone over and all such showing any infestation of seed pests were fumigated before delivery. From all of the above shipments 1,554 packages were seized and destroyed by burning on account of being infested with dangerous pests or of being prohibited from entry by regulations of the Federal Horticultural Board for which we act as representatives; 6,438 packages were fumigated either as a precaution or as being infested with cosmo-

politan pests already here; and 550 packages were not allowed to land on account of being infested with insect pests, fungi or being contraband under the rulings of the Federal Horticultural Board.

There is a material increase in vessels arriving during this period as compared with the period of 1917-1918. A large number of so-called tramp steamers arrived at the Port of Honolulu for the purpose of obtaining stores and fuel. All these boats are boarded and the captains served with the rules and regulations pertaining to horticultural inspection. The ship's stores and lockers are examined for vegetable matter, and when found infested with pests or diseases dangerous to the islands, are seized or ordered destroyed. On all the regular steamers and sailing vessels we examine the store rooms and vegetable lockers, which on many vessels are on the aft deck, noting the origin of the stores and preventing any seriously infested material from being exposed while in port. We have also collected infested material, placed same in tight bags and destroyed it in the incinerator on the Division grounds.

Appendixes Nos. 1 to 16 give a summary of the inspection work performed at Honolulu, Hilo, and Kahului as well as the inter-island inspection.

RICE AND BEAN SHIPMENTS.

It is very gratifying to be able to report that during the biennial period, the large shipments of rice consisting of 473,617 bags and bean shipments consisting of 59,598 bags arrived free from pests and were of good quality. All these shipments have the required certificates of inspection and fumigation on arrival here, in fact, a thorough cooperation now exists between this office and the Inspector of Agricultural Products in Japan.

INTER-ISLAND INSPECTION.

During the biennial period the usual inspection of plants, fruits, vegetables and other agricultural products going from the Port of Honolulu to the other islands has been kept up. Since the passing of Rule XX with amendment and Rule XXI, close watch has been kept on all plant shipments to see that no soil is being taken from Honolulu, also that all sugar cane for seed was shipped through the H. S. P. A. Experiment Station, having the required certificate of inspection by their staff and the required inspection tags from our Division. All fern plants or parts thereof, as well as Spanish Moss (*Tillandsia usneoides*) are seized and refused shipment.

During the biennial period 1,389 vessels plying between Honolulu and the ports on the other islands were attended to and

Contents of bag of contraband barley taken in the mail from Japan.
(Photo, Div. of Plant Insp. Original.)

89,993 packages of plants, fruits and vegetables were inspected. From this amount 612 packages were refused shipment on account of infestation, undesirable soil and non-compliance with regulations.

POST OFFICE INSPECTION.

Daily visits are made to the post office and more frequent visits on steamer days. Our office has the hearty cooperation of the post office staff. Space has been granted us for our own locker and a special box has been designated, into which all packages of seeds and plants are placed and are held for our inspection and disposal. From the mainland special bags containing only seeds and plants are forwarded here and these are placed near our locker awaiting our inspection and are entirely under our control until released.

In the foreign parcels post and registry division all packages containing horticultural matter are set aside and labelled with a red tag reading "Hold for Inspection" which is furnished by this Division. All such packages are turned over to us after entering the registry number in a book furnished for that purpose. These are then taken to the plant laboratory of the Division and thoroughly examined. Whatever is condemned is put into the incinerator and destroyed. After our inspection, such as has been passed is returned to the post office and in lieu of condemned material, a letter of explanation is placed in the covering which contained the material. In this way a thorough record is kept and everybody is satisfied. Among the materials examined we often find herbarium specimens, stuffed birds, pinned insects, etc., sent to museums or individual collectors. Though it might seem absurd to handle such material, yet we have found some of these infested with mites and other pests which would prove a menace to museums and libraries if they became established here.

FUMIGATION OF STORED PRODUCTS.

During the biennial period we have handled approximately 17,100 bags of stored products such as bran, wheat, corn, barley, beans, rice, macaroni, etc., also hardwood timber showing borer work, furniture attacked with white ants and books infested with the leather beetles. Realizing the importance of keeping their warehouses as free from pests as possible, dealers in such commodities as cited above have made good use of our fumigating vaults. By doing such work we are saving a lot of food from destruction. The common rice weevil, grain moth, bean weevil and other minor cereal pests are usually the cause of this infestation and when a commodity becomes infested the insects increase so rapidly that in a few months it is almost worthless as food.

By fumigating new shipments we can stay the attack of infestation for a long period, provided the merchants keep their warehouses reasonably clean, and this they realize is necessary.

PESTS INTERCEPTED IN THE COURSE OF INSPECTION.

Through the system of permits and notices of the Federal Horticultural Board, Washington, D. C., the shipments of plants and plant products from foreign countries are now under perfect control. This has in a measure decreased the quantities of foreign plant shipments materially and despite the fact that much dissatisfaction exists among importers of plants on account of the rigid regulations of the Board, when one considers the enormous list of dangerous insects likely to be introduced through importations, the system of the Federal Horticultural Board is very good and certainly timely. And yet notwithstanding all the regulations, the traveling public continues to bring along with their baggage plants, fruits, seeds and what not, which they pick up at random and which upon arrival, of course is seized and destroyed or returned if this can be done. From past experiences the greatest danger of introducing serious pests lies in baggage or small-lot shipments. Many of the pests we have today are still found in baggage and no doubt were brought here in the same way. Had the inspection of horticultural products been started many years ago, many of the serious pests and plant diseases we now have could have been kept out.

During the biennial period just finished it has been our good fortune to stop several pests which would raise havoc with our industries had they been allowed to get by. Appendix No. 17 shows the insect pests and diseases, mostly from alien countries, intercepted during the biennial period.

KEEPING OUT NEW PESTS.

In order to further the work of preventing the chance but possible introduction of new pests, particularly destructive sugar cane insects, from the mainland of the United States in the personal baggage of passengers, this Board on June 10, 1919, petitioned the Federal Horticultural Board of the U. S. Department of Agriculture to assist in safeguarding the agricultural industries of this Territory by adopting rules and regulations, under the Plant Quarantine Act of August 20, 1912, which would prohibit the introduction of certain articles, in the baggage of coastwise passengers, liable to harbor new insect pests and which would give the local representatives of the Federal Horticultural Board authority to require a declaration of baggage from all coastwise passengers, in the same manner as is required of passengers going

Fig. 1.

Fig. 1. Box of prohibited sandpears taken from immigrant from Japan.

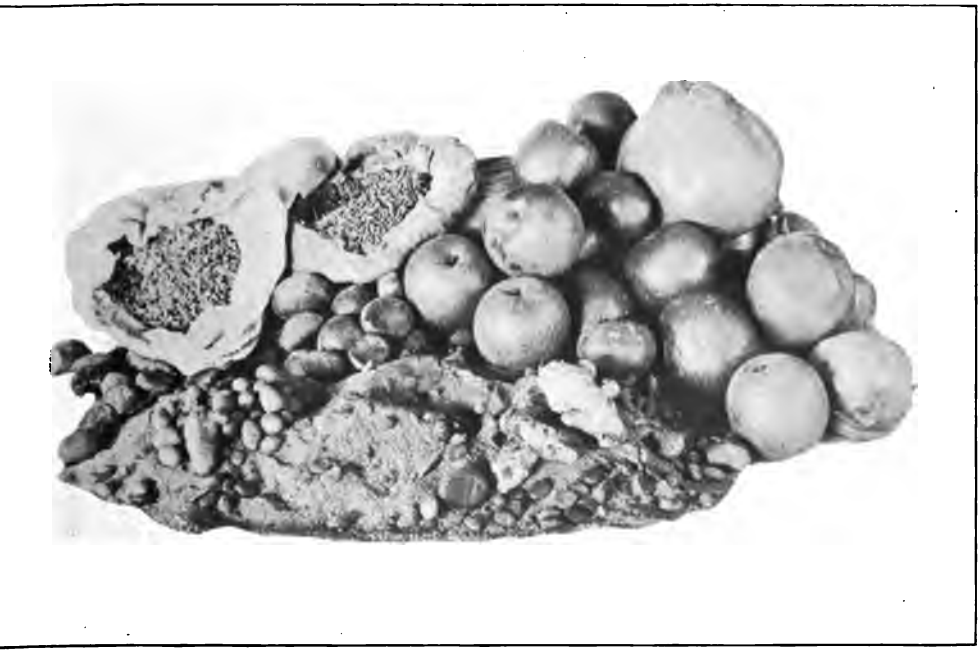


Fig. 2.

Fig. 2. Several lots of fruit, chestnuts, potatoes, paddy rice and soil in which the chestnuts were packed, from the Orient, seized as contraband and destroyed. (Photo, Div. of Plant Insp. Original.)

into San Francisco, and the power to examine when necessary the personal baggage of passengers arriving in this Territory in order to keep out the prohibited articles.

The pests which we are particularly anxious to keep out are, first, the pests not now in this Territory but which are rampant on the mainland of the United States, the West Indies, and the Panama Canal region, which might be brought to this Territory in the baggage of coastwise passengers and, second, the pests which are doing damage in foreign countries.

Some of these pests, including pernicious insects and plant diseases, which are not now in this Territory and which we must keep out in the interests of our agricultural pursuits are as follows:

PESTS OF THE MAINLAND AND ADJACENT TERRITORY.

The Sugar Cane and Corn Moth Borer.

(*Diatraea saccharalis,* Fab).

This is known to exist in Mexico, the West Indies, and the United States and is a serious pest on sugar cane and on corn. This species, or some closely allied species, does great harm to sugar cane in various parts of the world. Hawaii is one of the few sugar cane growing places where these insects do not exist.

The Sugar Cane Root Beetle (*Ligrus rugiceps*).

This beetle is known in several of the states and attacks the roots of sugar cane and some other agricultural products. Its introduction into Hawaii would be as harmful as the anomala beetle.

The Sugar Cane Borer Beetle (*Metamasius sericeus*).

This beetle of the West Indies is allied to the Hawaiian sugar cane borer and attacks sugar cane in the same manner. It is known from the West Indies, South and Central America, and Cuba.

The West Indies Sugar Cane Leaf Hopper

(*Saccharosydne saccharivora*).

This insect was first noticed in 1833 when it devastated the sugar cane fields of Grenada. Since then it has periodically been reported as causing harm to cane. It occurs in Florida.

Sugar Cane Frog Hoppers (*Tomaspis spp.*).

A number of species of this genus are known from the United States, Central America, and the West Indies. Among them are some of the most destructive pests on sugar cane in the West Indies and Trinidad.

The Avocado Weevil (*Heilipus lauri*).

This is a pest on avocado or alligator pears and is known to exist in Florida.

The Papaya Fruit Fly (*Toxotrypana curvicauda*).

This is a pest on papaya and is also known to exist in Florida.

The Alfalfa Weevil (*Hypera postica*).

This is the worst pest on alfalfa in the United States.

The Cotton Boll Weevil (*Anthonomis grandis*).

This notorious pest would be as serious as the pink boll worm which is already in Hawaii.

European Corn Borer (*Pyrausta nubilalis*).

This insect pest of the Indian corn is regarded by many authorities as the most dangerous pest of corn that has ever appeared in America. It has recently spread over areas in Massachusetts, New Hampshire, New York, and Pennsylvania and a strict quarantine against this pest by several states adjacent to infested areas as well as a Federal quarantine have been promulgated in the endeavor to check its spread.

The Jamaica Pineapple Borer (*Metamasius ritchiei* Mshl).

The pineapple industry of this Territory has grown to such proportions that should serious pineapple pests become established here the industry would receive a severe setback. Fortunately there are now only two pests which attack the Hawaiian pineapple, the mealy bug (*Pseudococcus bromeliae*) and the pineapple scale (*Diaspis bromeliae*) both of which under clean culture methods have not proven to be serious pests. The damage wrought by the Jamaica pineapple borer on pineapple fruit and the adult bettle are shown on Plate XIX. Mr. A. H. Ritchie, Entomologist of the Jamaican government stated recently that pineapples are now a back number in that country because of the damage wrought by this pineapple borer. The fruit is grown now only for the local markets and exports of the pineapple have ceased because of this pest, the pineapple blight, and the mealy bug. In order to guard against the introduction of new pineapple pests, all pineapple suckers, imported to improve existing varieties and to develop strains to resist the pineapple wilt only, are fumigated and kept in quarantine for a period of six months or longer and from the introduced plants only the new sprouts or suckers are used for propagation.

The Pink Disease of Citrus (*Corticium salmonicolor* B and Br.).

This disease of the citrus was discovered in the Fall of 1917, in the Philippine Islands, and is reported also to occur in Porto Rico. The first stage of the disease appears as a slight gumming,

Plate XIX.

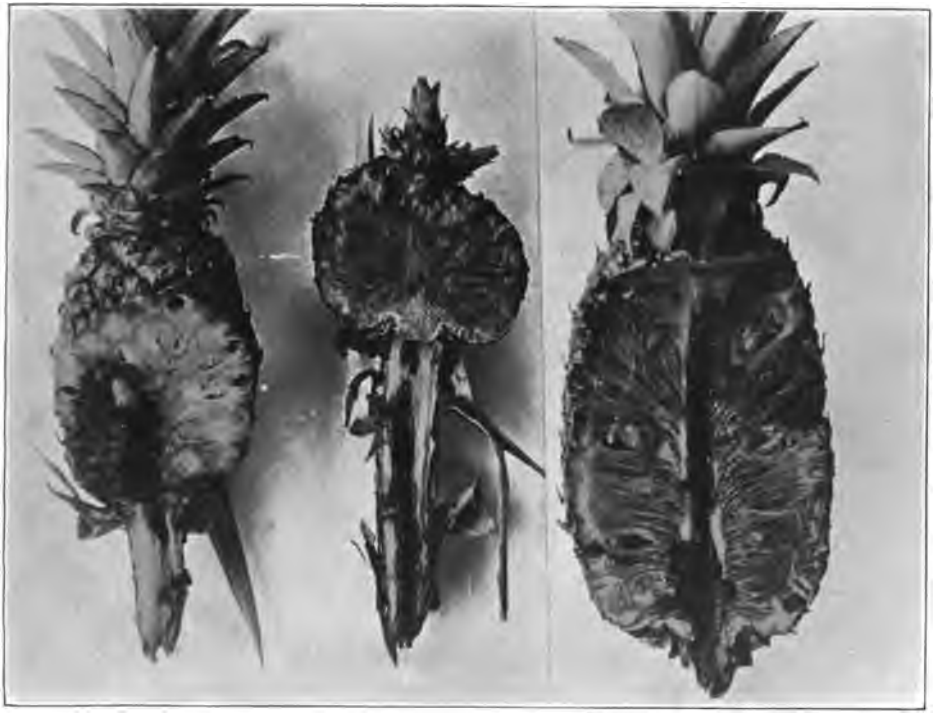


Fig. 1.
JAMAICAN PINEAPPLE BORER (**Metamasius ritchiei** Mshl.)
Fig. 1. Showing injury by larva to pineapple fruit.

Fig. 2.
Fig. 2. Adult Beetle.
(Photo by Division of Plant Inspection.)

the bark seems dry and hard and adheres closely to the wood. The disease seems to spread rapidly during the rainy seasons. Longitudinal cracks form in the bark and the first appearance of the fungus is in the form of pustules of a dirty white to pinkish color. The pustules are followed by the formation of the mycelium of the fungus over the surface of the branch which appears as a pink incrustation and is the most striking characteristic of this fungus disease. Plate XX, photographed from a color plate (Pink Disease of Citrus, Lee and Yates, Philippine Journal of Science. Vol. XIV—No. 6), illustrates this disease in its various stages.

PESTS OF FOREIGN COUNTRIES.

The Yellow Maize Moth (*Dichocrocis punctiferalis*).

This is a very serious pest of corn or maize in Australia, and although primarily a maize pest, it is also recorded as attacking other plants, such as the peach, orange, loquat, guava, banana, and castor bean. The adult moth illustrated by Fig. 8, Plate XXI, is a pale orange yellow in color and is marked with numerous black dots on the wings and body. The larva, Fig. 6, enters the stalk and does considerable damage to the crops when the pest is abundant. This insect would prove a very serious pest to many of our useful plants.

The Yellow Monolepta Beetle (*Monolepta rosae* Blackb.).

This is another Australian corn pest, and consists of a beetle only one-fourth of an inch long, with yellow body and legs and a bright red patch on each shoulder, and on the middle of each elytrum a small red spot, as shown in Fig. 9, Plate XXI. This beetle attacks the silk of the corn ear and is also a serious pest in the orchard where it attacks the blossoms and foliage of the citrus and other trees, denuding them in a few days. Their work is similar to that of the rose beetle, which we already have in Hawaii, except that the denudation of the plant foliage is complete. Figs. 1 to 5 of Plate XXI, show the common corn ear worm (*Chloridea obsoleta*) which is also called the cotton boll worm and the tomato worm. This is a very common pest of many countries, and although found here in Hawaii, so far as observation goes, it does no damage to the corn ears in these islands. It has also been reared from tomato stems, but it is not a serious pest.

The Pink Borer (*Sesamia vuteria* Stoll.).

This is one of three moths which are reported in the Mauritius Bulletin, No. 5, Department of Agriculture, 1917, as being serious pests as borers in sugar cane. They are also reported from other countries. The pink borer was first reported from Southern France on corn and later from Spain on sorghum. In 1879, it was reported from Reunion, Madagascar, the Celebes, and Java on sugar cane. This pest is not restricted to corn and sugar cane,

however, but indiscriminately attacks all kinds of graminaceous plants.

The Spotted Borer (*Diatrea sacchariphaga* Boyer).

This moth was introduced into Mauritius as early as 1848. It is now also found in India, Ceylon, and Bourbon, where it attacks sugar cane and other crops such as corn, sorghum and rice. The damage that it does to sugar cane often amounts to 22%.

The White Borer (*Grapholita chistaceana*).

This Tortricid moth was reported from Java in 1905 and Mauritius in 1911. It is also a sugar cane pest in Reunion where it causes very serious injury. In Java the cane stalk, as well as the shoots, is attacked, the larva entering the stalk through the eye. As a rule the shoots are bored as soon as they sprout. The eggs are laid on the blade or sheaths and as soon as they hatch the larvae crawl down and enter the under ground portion of the shoot near its junction with the cutting. Plants that are thus attacked soon dry up.

CITRUS CANKER.

The finding of citrus canker (*Pseudomonas citri*) on the Kawahara property up Kalihi Valley, Honolulu, on some grapefruit trees as reported upon in my monthly report for March, 1920, caused this Division to keep close watch on the property after the infested trees had been destroyed. In company with Dr. H. L. Lyon, Mr. D. T. Fullaway and others, several visits were made during the year. Citrus canker does not seem to be as active in our climate as it is in Florida where the United States government was much concerned about its appearance. Since the discovery of this disease in Kalihi Valley, Dr. Lyon has found it on Kauai and believes it to exist also on Hawaii. Probably the disease has been here a long time and has been mistaken for *Cladosporium citri* in the past. As far as observations have been made there is no necessity for alarm unless an abundance of rain will cause a more rapid development of the disease. We shall continue to watch developments meanwhile and should the disease become threatening we have ample power under Rule XII to make a thorough cleanup.

RULES AND REGULATIONS.

During the period just ended the following changes have been made in the rules and regulations pertaining to the Division of Plant Inspection and became effective on the following dates:

On June 1, 1919, Rule XX, repealing Rule XVII, took effect. It concerns the inter-island inspection of fruits, vegetables and plants under certain conditions and is a great improvement over the old rule. (See Appendix No. 18).

Plate XX.

PINK DISEASE ON CITRUS.

Fig. 1. Early stage of Pink disease on Citrus (**Corticium salmonicolor** B. and Br.) showing gumming and first appearance of pustules.

Fig. 2. Showing sterile mycelium and advancing hyphae of **Corticium salmonicolor.**

Fig. 3. Necator stage of the fungus on Citrus twigs.

Fig. 4. Another specimen, showing necator stage of the fungus on citrus twigs.

(ALL NATURAL SIZE.) Photographed from Plate II., Phil. Jour. Sci. XIV. No. 6.

ans	Apples	Cabbage	Celery	Lemons	Onions	Oranges	Potatoes	Inspected Passengers' Baggage
111	1,409	46	..	176	3,147	2,314	6,317	2,045
577	1,577	..	21	266	1,157	1,669	8,164	4,738
266	3,395	..	..	1,172	3,058	4,717	11,450	5,687
27	496	3	21	345	802	2,096	5,109	4,382
837	6	..	..	242	409	1,540	4,415	3,736
017	78	..	..	351	887	1,550	2,400	4,355
766	727	20	61	579	3,392	3,424	8,418	4,332
730	1,790	..	83	418	1,410	1,276	5,394	4,619
013	3,791	30	70	306	2,298	706	3,946	4,161
183	10,179	106	69	734	3,016	1,703	8,764	8,876
576	17,303	211	108	585	1,645	2,193	7,481	3,752
374	5,982	194	263	373	1,968	5,337	7,224	5,830
477	46,733	610	696	5,547	23,189	28,525	79,082	56,543

ans	Apples	Cabbage	Celery	Lemons	Onions	Oranges	Potatoes	Inspected Passengers' Baggage
395	1,856	175	92	127	952	2,704	4,573	3,330
107	915	128	38	796	900	3,676	6,225	3,940
820	2,198	80	74	467	2,088	2,863	6,740	3,315
757	2,701	42	40	745	1,582	3,135	7,780	6,514
715	137	35	41	279	698	1,894	2,092	2,910
512	53	..	..	20	1,171	2,940	5,610	4,908
394	683	221	112	537	2,995	2,436	4,899	1,618
451	3,918	127	212	920	2,811	3,191	6,781	4,458
418	9,342	261	171	768	4,145	2,086	6,599	4,332
794	12,312	308	171	713	3,161	1,926	11,926	5,173
426	15,075	548	303	569	3,279	2,310	9,272	1,398
199	9,266	275	248	400	1,613	4,805	11,062	1,429
988	58,457	2,200	1,502	6,341	25,395	33,966	83,559	44,315

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017	78	..	..	351	887	1,550	2,400	4,355
766	727	20	61	579	3,392	3,424	8,418	4,332
730	1,790	..	83	418	1,410	1,276	5,394	4,619
013	3,791	30	70	306	2,298	706	3,946	4,161
183	10,179	106	69	734	3,016	1,703	8,764	8,876
576	17,303	211	108	585	1,645	2,193	7,481	3,752
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820	2,198	80	74	467	2,088	2,863	6,740	3,315
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512	53	..	..	20	1,171	2,940	5,610	4,908
394	683	221	112	537	2,995	2,436	4,899	1,618
451	3,918	127	212	920	2,811	3,191	6,781	4,458
418	9,342	261	171	768	4,145	2,086	6,599	4,332
794	12,312	308	171	713	3,161	1,926	11,926	5,173
426	15,075	548	303	569	3,279	2,310	9,272	1,398
199	9,266	275	248	400	1,613	4,805	11,062	1,429
988	58,457	2,200	1,502	6,341	25,395	33,966	83,559	44,315

On July 18, 1919, Rule XVIII, concerning the control of fungus diseases on pineapples was amended to permit shipments of pineapple fruit, crowns, slips and suckers from Honolulu to ports on the islands of Hawaii and Molokai. (See Appendix No. 19).

On October 31, 1919, Rule I, concerning the general inspection of all importations of plants and fruits was further amended to permit the shipment of fresh apples from New Zealand in cold storage only and certified to be free from insect pests and plant diseases and that the fruit was grown in New Zealand and did not come in contact with Australian grown fruit on the voyage to the Territory of Hawaii. (See Appendix No. 20).

On February 25, 1920, Rule XXI, concerning the control of certain insect and plant pests in the Territory from spreading between one island in the Territory to any other island in the Territory was passed. (See Appendix No. 21).

On May 7, 1920, this Rule was amended and instead of all ginger being prohibited from shipment, only one species (*Hedychium coronatum*) was prohibited, it being the species attacked by the ginger weevil. (See Appendix No. 21).

On May 26, 1920, Rule XXI, pertaining to the control of insect and plant diseases in the Territory of Hawaii was materially changed and revised and makes a decidedly stronger regulation for the purpose of which it was passed. (See Appendix No. 22).

On May 26, 1920, Rule XXII, pertaining to apple and potato shipments from Pacific Coast ports to the Territory of Hawaii was passed. By this regulation all shipments destined for this Territory must be accompanied by certificates of inspection stating that the shipment is reasonably clean and free from pests and diseases. (See Appendix No. 23).

On June 1, 1920, Rule XX was amended by changing Section 5 and making the shipment of plants in sterilized soil under certain conditions more feasible. (See Appendix No. 18).

FEDERAL HORTICULTURAL BOARD.

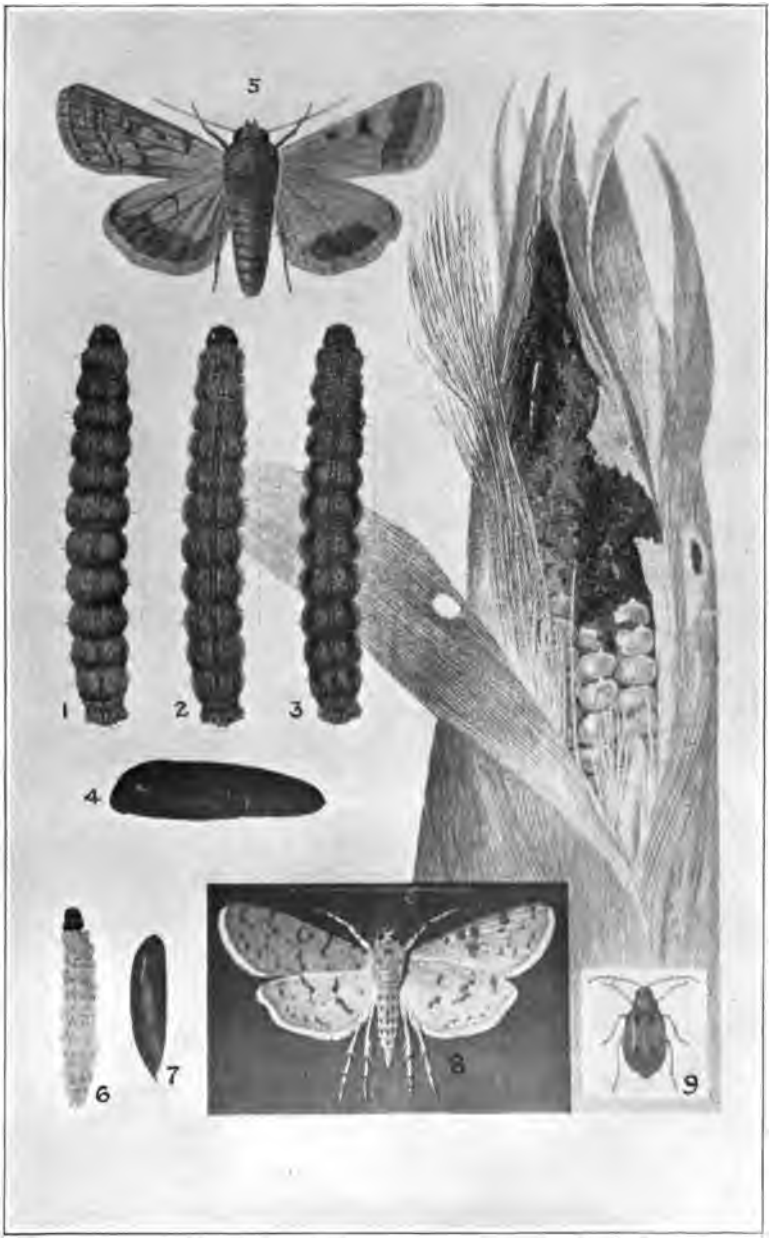
In my report of 1917-1918 I gave a list of the various Notices of Quarantine passed by the Federal Horticultural Board of the U. S. Department of Agriculture during that period. Since then a number of very important notices with regulations have been passed, some of which from time to time were published in the "Forester and Agriculturist." A complete list of all the Notices is given in Appendix No. 24.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

APPENDIX NO. 3.
HILO INSPECTION
1919.

Month.	PASSED						TOTAL INSPECTED													
	Vessels Inspected.	Vessels Carrying Vegetable Matter	Lots	Parcels	Fumigated.	Burned	Lots	Parcels	Seeds	Plants	Cabbages	Celery	Lemons	Onions	Apples	Oranges	Potatoes	Rice	Beans
Jan.	8	2	69	2,365	..	..	69	2,365	...	..	..	..	5	502	625	57	1,043	....	....
Feb.	9	4	107	2,876	..	..	107	2,876	7	..	..	..	86	421	961	396	950	7,720	1,019
Mar.	11	3	47	1,393	..	..	47	1,393	2	3	..	..	9	200	150	170	850	....	....
Apr.	10	3	107	1,649	2	..	109	1,651	16	5	..	3	29	264	49	286	988	4,916	539
May	10	3	107	2,090	..	..	107	2,090	6	3	..	..	20	359	...	390	1,045	....	....
June	7	3	67	1,587	..	..	67	1,587	4	..	..	6	10	181	...	325	845	2,450	282
July	8	1	92	1,830	..	..	92	1,830	3	..	..	5	19	246	418	364	519	....	....
Aug.	7	2	124	1,450	..	..	124	1,450	17	3	..	8	35	152	352	183	396	5,702	360
Sept.	6	1	13	13	..	..	18	13	11	2	..	..	..	....	....	....	....	....	....
Oct.	6	2	105	2,328	..	..	105	2,328	7	..	..	5	26	472	612	256	781	....	603
Nov.	7	5	233	5,686	..	..	233	5,686	4	2	..	4	35	794	1,835	820	1,616	....	....
Dec.	7	3	69	3,703	..	..	69	3,703	118	1	..	4	11	485	955	473	946	190	477
Total	96	32	1,140	26,970	2	..	1,142	26,972	195	19	..	35	235	4,026	5,952	3,670	9,979	20,978	3,280



THE CORN EAR-WORM (**Chloridea obsoleta** Fab).

Fig. 1. Larva of Corn Ear-Worm.
Figs. 2 and 3. Larvae of same showing color variation.
Fig. 4. Pupa of same.
Fig. 5. Adult moth.
Corn cob shows damage by Corn Ear-Worm.

THE YELLOW MAIZE OR PEACH MOTH (**Conogethes punctiferalis** Gn.)

Fig. 6. Larva of yellow maize moth.
Fig. 7. Pupa of same.
Fig. 8. Adult moth.

YELLOW MONOLEPTA BEETLE (**Monolepta rosae** Blackb.)

Fig. 9. Adult beetle.

(From W. B. Gurney. Agr. Gazette, N. S. W., March 3, 1919.)

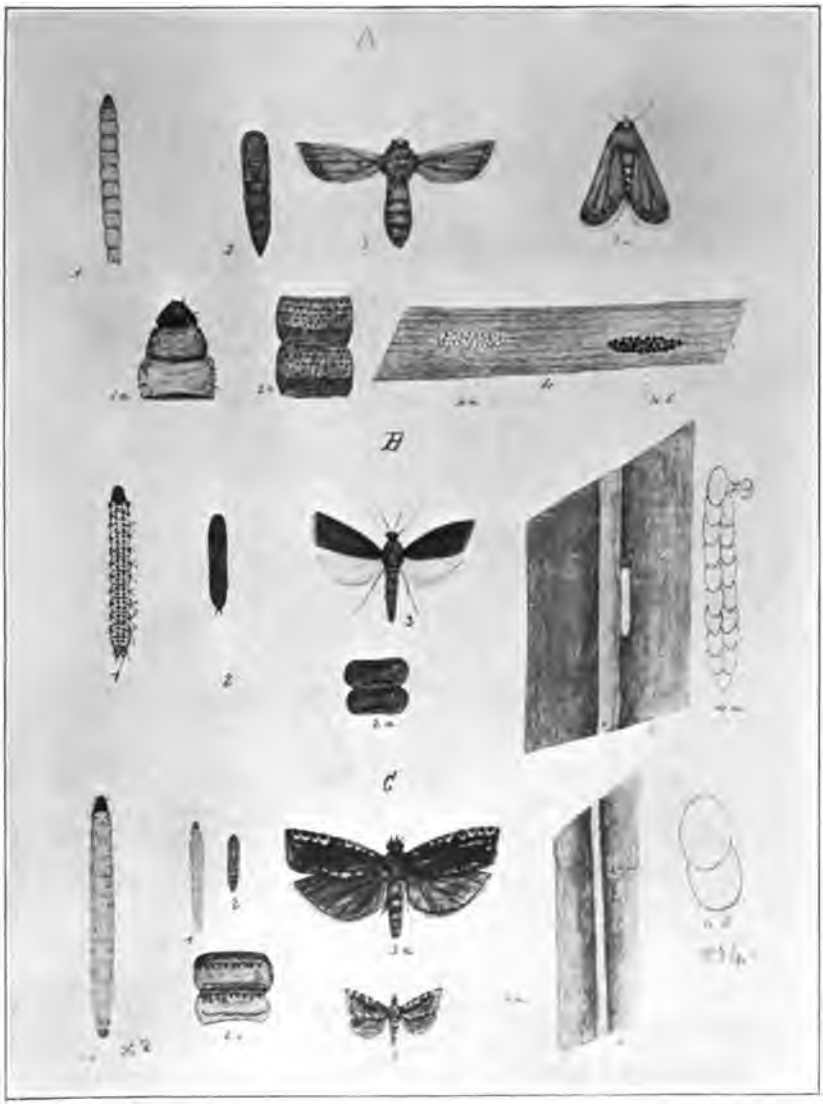
APPENDIX NO. 4.
HILO INSPECTION
1920.

Month.	Vessels Inspected	Vessels Carrying Vegetable Matter	PASSED			TOTAL INSPECTED											
			Lots	Parcels	Burned	Lots	Parcels	Seeds	Plants	Apples	Celery	Lemons	Onions	Oranges	Potatoes	Rice	Beans
Jan.	4	2	53	882	..	53	882	3	1	260	8	12	42	213	283	.....	....
Feb.	6	4	73	1,436	..	73	1,436	5	3	145	4	46	327	184	695	2,883	110
Mar.	6	2	82	1,911	..	82	1,911	8	5	175	4	17	423	400	840	.....	....
Apr.	7	6	127	2,186	..	127	2,186	19	4	235	4	46	266	660	868	2,500	187
May	6	4	123	1,349	..	123	1,349	23	3	115	12	62	179	554	320	.....	...
June	6	4	238	1,944	1	239	1,945	8	..	115	6	76	235	635	405	3,845	517
July	5	3	194	2,068	..	194	2,068	10	..	273	6	62	325	721	208	.....	....
Aug.	5	2	143	2,119	..	143	2,119	6	..	489	4	16	375	291	562	.....	....
Sept.	5	3	141	3,010	..	141	3,010	4	..	809	7	24	696	318	905	.....	....
Oct.	9	7	301	6,985	..	301	6,985	...	..	2,163	11	97	1,217	673	1,690	5,033	493
Nov.	6	4	195	3,590	..	195	3,590	5	..	1,529	8	52	484	515	618	.....	....
Dec.	6	4	153	4,309	..	153	4,309	9	3	1,996	16	32	296	781	640	570	546
Total	71	45	1,823	31,789	1	1,824	31,790	100	19	8,304	90	502	4,865	5,945	8,034	14,831	1,853

APPENDIX NO. 5.
KAHULUI INSPECTION
1919.

Month.	Vessels Inspected	Vessels Carrying Vegetable Matter	PASSED Lots	PASSED Parcels	Burned	Returned	TOTAL INSPECTED Lots	TOTAL INSPECTED Parcels	Plants	Apples	Celery	Lemons	Onions	Oranges	Potatoes
Jan.	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Feb.	6	2	42	1,192	..	..	42	1,192	..	337	..	11	260	40	535
Mar.	5	1	14	439	..	..	14	439	..	195	..	3	130	8	100
Apr.	5	1	36	519	..	..	36	519	..	85	..	11	48	128	220
May	4	1	26	298	..	..	26	298	..	....	..	5	45	50	160
June	5	1	48	458	..	..	48	458	..	....	1	8	100	60	225
July	6	1	12	361	..	..	12	361	..	51	5	10	85	100	80
Aug.	8	1	8	453	4	..	9	457	..	50	7	11	60	75	105
Sept.	7	1	4	481	..	..	4	481	..	65	4	7	110	55	120
Oct.	6	1	6	698	..	..	6	698	..	185	2	14	168	57	225
Nov.	5	1	13	1,123	..	..	13	1,123	1	285	10	14	255	58	430
Dec.	8	1	9	1,003	..	1	10	1,004	1	285	8	13	115	155	360
Total	72	12	218	7,025	4	1	220	7,030	2	1,488	37	107	1,321	786	2,560

Plate XXII.



A

PINK BORER (**Sesamia ruteria** Stoll).

Fig. 1. Full-grown caterpillar. (1a) Head of same, much enlarged.
Fig. 2. Chrysalis. (2a) 2 segments of same much enlarged.
Fig. 3. Moth Borer with expanded wings. (3a) Same, wings at rest.
Fig. 4. Portion of maize leaf sheath showing in (4a) cluster of non-parasitized eggs and in (4b) parasitized eggs.

B

SPOTTED BORER (**Diatrea sacchariphaga** Bojer=D. **striatalis** Snellen.)

Fig. 1. Full-grown caterpillar.
Fig. 2. Chrysalis. (2a) Segments of same much enlarged.
Fig. 3. Moth Borer.
Fig. 4. Sugar cane leaf showing egg cluster against the mid rib. (4a) Egg cluster much enlarged (x9).

C

WHITE BORER (**Grapholita (Olethretus) chistaceana**).

Fig. 1. Caterpillar. (1a) Same enlarged (x2).
Fig. 2. Chrysalis. (2a) Segments of same enlarged.
Fig. 3. Moth Borer (natural size). (3a) Same enlarged.
Fig. 4. Sugar cane leaf showing in (4a) eggs natural size. (4b) Eggs much enlarged (x14).

(After D. D'Emmerez de Charmoy: Bulletin 5. Dept. of Agr. Mauritius. 1917.)

APPENDIX NO. 6.
KAHULUI INSPECTION
1920.

Month.	Vessels Inspected	Vessels Carrying Vegetable Matter	PASSED Lots	PASSED Parcels	TOTAL INSPECTED Lots	TOTAL INSPECTED Parcels	Seeds	Plants	Apples	Celery	Lemons	Onions	Oranges	Potatoes
Jan.	7	3	12	1,008	12	1,008	1	2	285	2	10	115	125	400
Feb.	8	2	12	719	12	719	..	..	135	2	7	80	98	360
Mar.	5	2	11	692	11	692	..	..	70	1	13	185	178	280
Apr.	8	2	9	478	9	478	..	..	80	2	7	125	100	150
May	8	2	8	350	8	350	..	..	10	2	10	140	115	60
June	7	2	14	534	14	534	..	..	....	..	18	115	290	60
July	10	3	16	816	16	816	..	..	62	8	25	120	420	75
Aug.	7	2	18	1,203	18	1,203	..	..	275	9	16	192	380	170
Sept.	9	2	16	1,737	16	1,737	..	..	485	10	13	270	375	460
Oct.	6	2	18	2,104	18	2,104	..	..	735	13	11	350	440	390
Nov.	4	2	14	3,233	14	3,233	..	..	1,720	14	19	820	70	455
Dec.	8	2	16	2,246	16	2,246	..	..	859	9	13	145	430	599
Total	87	26	164	15,120	164	15,120	1	2	4,716	72	162	2,607	3,021	3.459

APPENDIX NO 7.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1919.

(DOMESTIC)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	1,408	1,568	3,385	495	....	76	717	1,790	3,789	10,162	17,294	5,974	46,658
Apricots	....	....	....	....	3	265	501	6	20	....	....	....	795
Artichokes	....	2	4	12	11	10	1	....	1	1	11	24	77
Asparagus	....	....	6	37	22	14	3	....	....	....	....	....	82
Beans	....	....	....	....	1	....	1	150	1	34	....	....	187
Beets	20	60	35	10	....	5	....	10	....	10	5	20	175
Bulbs	6	12	11	13	21	10	2	4	....	5	10	18	112
Cabbages	....	....	....	3	....	....	....	....	30	106	211	194	544
Cabbage (Pake)	46	....	....	....	....	....	20	....	....	....	....	....	66
Carrots	15	70	35	....	....	....	8	....	....	....	5	10	143
Cauliflower	....	30	18	21	43	51	72	85	74	56	93	286	829
Celery	....	21	....	21	....	12	61	83	70	69	108	263	708
Celery Root	....	....	....	....	....	....	....	....	....	....	....	3	3
Cherries	....	....	....	....	205	778	1,234	....	1	....	....	....	2,218
Cranberries	....	....	....	....	....	....	....	....	....	....	50	69	119
Fruit	8	5	39	20	9	23	38	34	57	69	36	25	363
Garlic	4	10	4	1	5	6	13	40	1	14	15	14	127
Grapefruit	79	190	427	267	163	293	376	210	43	48	155	367	2,618
Grapes	21	....	....	....	....	....	....	1,242	1,858	1,615	1,220	305	6,261
Horse Radish	....	....	2	3	....	1	5	1	....	2	....	5	19
Lemons	176	266	1,172	344	242	350	576	418	303	734	585	373	5,539
Lettuce	....	....	....	....	....	....	....	....	2	....	1	20	23
Megs	....	....	....	....	....	33	340	327	176	41	13	2	932
Melons	....	....	....	....	....	....	17	258	60	3	20	....	358
Nectarines	....	....	....	....	....	....	60	736	17	....	....	....	813
Nuts	1	49	8	1	14	....	....	9	4	39	48	29	202
Onions	3,146	1,145	3,089	799	408	538	3,863	1,386	2,287	3,001	1,630	1,951	22,693
Oranges	2,311	1,652	4,708	2,092	1,533	1,544	3,413	1,273	701	1,696	2,185	5,324	28,432
Parsnips	7	14	23	....	....	....	18	36	2	8	10	20	138
Peas	....	....	....	....	2	2	1	1	1	....	....	....	7
Peaches	....	....	....	....	....	372	1,284	1,453	768	83	....	....	3,955
Rhubarb	....	7	8	19	28	11	10	15	2	....	7	5	112
Pears	....	....	....	10	....	....	246	599	519	295	191	294	2,154
Persimmons	....	....	....	....	....	....	....	....	....	215	348	272	835
Plants	6	35	68	37	36	29	107	16	19	9	17	195	574
Plums	....	....	....	....	....	108	1,691	1,617	858	57	....	....	4,331
Prunes	....	....	....	....	....	....	1	....	....	....	1	66	68
Quinces	....	....	....	....	....	....	....	....	....	2	....	....	2
Seeds	29	42	54	102	72	49	62	47	51	105	79	60	752
Sprouts	....	2	23	....	....	....	....	....	....	....	6	21	52
Potatoes	6,817	8,164	11,450	5,101	4,413	2,171	8,415	5,393	3,942	8,714	7,480	7,223	78,783
Squash	3	4	2	....	....	....	....	....	....	....	6	7	22
Tangerines	751	585	1,533	1,044	15	....	10	....	....	10	19	1,282	5,249
Tomatoes	....	....	....	....	....	....	....	....	1	150	8	....	159
Turnips	16	90	120	25	16	4	49	119	4	35	75	107	660
Trees	....	....	....	....	....	1	....	....	....	....	....	....	1
Vegetables	30	8	1	16	1	....	1	15	1	4	6	25	108
Totals	14,400	14,031	26,175	10,493	7,368	6,755	22,717	17,978	15,658	27,892	31,948	24,853	219,058

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	1,848	908	2,185	2,689	124	39	680	3,912	9,337	12,295	15,064	9,266	58,347
Apricots	2	....	....	....	....	277	79	1	....	....	5	....	364
Artichokes	4	9	31	30	26	30	19	1	5	7	21	16	199
Beans	1	1	....	5	....	....	....	99	2	1	37	....	146
Cabbage	175	134	80	42	35	....	221	127	261	308	548	275	2,206
Asparagus	....	14	35	32	34	26	54	....	....	....	....	....	195
Carrots	69	37	40	77	....	....	19	46	62	134	48	10	542
Cauliflower	148	118	201	122	143	201	209	309	285	218	376	323	2,603
Celery	92	38	74	40	41	1	112	212	171	171	303	248	1,503
Cherries	....	....	....	....	206	1,226	848	4	....	....	....	....	2,284
Cranberries	....	....	....	....	....	....	....	....	....	....	85	37	122
Beets	15	30	19	15	5	50	20	15	20	20	20	11	240
Fruit	33	42	68	15	33	51	58	49	115	99	64	46	668
Garlic	9	39	32	37	4	28	28	27	43	25	82	50	444
Grapefruit	90	159	357	283	156	311	317	246	303	311	391	271	3,195
Grapes	25	....	....	....	....	....	47	1,005	3,338	3,051	1,092	946	9,504
Horse Radish	1	2	....	1	2	....	....	2	....	4	5	5	22
Lemons	125	795	467	745	279	517	537	920	768	713	569	400	6,835
Lettuce	10	12	25	22	15	19	14	12	19	16	29	49	242
Megs	....	....	....	....	....	180	476	560	268	119	47	....	1,650
Melons	....	....	....	....	....	....	....	57	109	124	164	12	466
Nectarines	....	....	....	....	....	....	....	345	18	....	....	....	363
Nuts	5	21	1	....	....	....	....	7	2	1	109	38	184
Onions	946	891	2,084	1,572	495	1,156	2,974	2,808	4,135	3,151	3,270	1,613	25,095
Oranges	2,692	3,672	2,849	3,126	1,882	2,926	2,483	3,185	2,086	1,918	2,305	4,804	33,878
Parsnips	16	19	20	10	12	25	22	8	21	28	16	12	204
Peas	....	....	5	....	41	4	1	1	8	8	....	1	64
Peaches	....	....	....	....	....	615	1,133	1,425	1,038	240	38	....	4,489
Rhubarb	18	17	39	37	35	45	15	2	7	23	13	19	270
Pears	15	15	26	20	....	....	350	671	1,279	770	199	15	3,360
Persimmons	....	....	....	....	....	....	....	....	....	500	574	159	1,233
Plants	37	3,583	61	79	38	16	30	13	22	22	79	74	4,054
Plums	....	....	....	....	....	366	1,289	1,844	855	278	15	....	4,647
Prunes	2	....	....	....	....	....	....	....	....	10	....	....	12
Quinces	....	....	....	....	....	....	....	....	2	....	1	....	3
Seeds	82	120	178	531	159	112	128	159	67	67	69	44	1,716
Sprouts	1	1	....	....	....	....	....	....	....	....	14	18	34
Potatoes	4,570	5,902	6,738	4,758	1,692	588	4,899	5,929	6,594	11,506	9,242	11,062	73,475
Squash	....	....	....	....	....	....	....	....	10	11	7	12	40
Sweet Potatoes	....	2	....	....	....	....	....	....	1	....	....	....	3
Tangerines	562	281	166	482	47	....	....	....	....	....	155	1,753	3,396
Tomatoes	....	....	....	....	....	....	....	....	....	....	1	....	1
Turnips	46	89	55	78	58	125	173	106	90	69	48	103	1,040
Trees	....	3	1	4	....	1	....	....	....	....	....	219	228
Vegetables	7	13	2	1	....	11	3	22	....	4	7	10	80
Bulbs	19	11	16	14	12	6	2	1	....	5	9	4	99
Totals	11,665	16,928	15,850	14,867	5,574	8,947	17,190	24,170	31,291	36,217	35,121	31,925	249,745

APPENDIX NO. 9.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1919.

(FOREIGN)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	1	9	10	1	6	2	10	....	2	17	9	8	75
Asparagus	2	....	3	....	....	2	....	....	....	....	....	1	8
Bamboo Shoots	....	....	....	....	....	1	....	....	....	....	....	....	1
Beans	....	14	....	64	....	20	110	....	....	2	25	....	235
Chestnuts, Water	18	40	62	26	37	24	48	60	28	16	61	61	481
Caladiums	4	65	5	....	....	....	....	....	....	....	....	....	74
Bananas	....	1	5	....	....	....	....	....	....	....	....	....	6
Chestnuts, Green	....	31	14	....	....	....	....	9	49	56	129	31	319
Cocoanuts	....	....	....	24	1	....	....	24	....	....	....	....	49
Corn	....	1	....	....	....	2	....	....	....	1	....	1	5
Fruit	....	....	....	....	....	1	....	....	9	5	....	....	15
Garlic	4	2	30	25	19	26	47	57	41	116	18	22	407
Grapefruit	2	....	1	2	8	8	2	....	....	....	4	8	30
Horse Radish	1	....	3	....	6	3	1	....	....	....	1	1	16
Lemons	....	3	....	1	....	1	3	....	3	....	....	....	11
Limes	....	1	....	....	....	....	....	....	....	....	....	....	1
Ginger	10	21	26	21	31	36	78	69	56	38	28	48	462
Nuts	2	4	6	....	....	....	14	35	2	37	11	23	134
Onions	1	12	19	3	1	349	29	24	11	15	15	17	496
Oranges	3	17	9	4	1	6	11	3	5	7	8	13	87
Olives	....	1	....	....	....	....	....	....	....	....	....	....	1
Peas	....	....	....	....	....	....	....	....	....	10	....	....	10
Peanuts	....	....	....	....	302	32	126	55	50	188	173	40	966
Pears	....	....	....	....	....	....	1	....	1	....	....	....	2
Plants	....	39	68	3,112	2,876	3	7	20	2	8	2	13	5,650
Plums	....	....	....	....	....	....	1	....	....	....	....	....	1
Pomelo	....	3	....	2	....	....	....	....	....	2	....	1	8
Seeds	35	107	92	58	126	45	58	44	119	372	82	66	1,194
Sandpears	....	....	2	....	6	3	2	5	7	7	11	10	59
Potatoes	....	....	....	8	2	29	3	1	4	50	1	1	99
Whitenuts	....	....	8	....	....	....	....	....	....	11	10	16	45
Sweet Potatoes	4	4	7	3	11	11	8	2	2	3	4	9	68
Tangerines	6	6	3	1	....	....	....	....	....	....	15	20	51
Taro	....	1	....	22	....	1	2	1	....	....	4	2	33
Yams	16	19	16	26	49	30	35	56	58	41	49	44	434
Trees	....	....	....	331	....	....	....	....	....	....	....	....	331
Vegetables	....	....	....	....	13	....	10	....	3	....	1	....	27
Bulbs	7	10	3	3	3	....	....	....	16	109	8	9	168
Totals	116	411	398	3,737	2,998	635	606	455	463	1,111	670	459	12,059

APPENDIX NO. 10.

FRUITS AND VEGETABLES RECEIVED IN HONOLULU DURING 1920.

(FOREIGN)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	8	7	18	12	18	15	3	6	6	17	11	17	128
Asparagus	1	2	1	1	1	....	....	....	....	....	....	3	9
Bamboo Shoots	1	2	....	2	1	....	....	....	....	....	....	....	6
Beans	6	....	1	21	1	....	30	72	78	6	29	75	319
Chestnuts, Water	50	49	34	36	70	57	64	14	29	23	87	74	587
Caladiums	42	116	31	11	....	....	....	....	....	....	....	....	200
Chestnuts, Green	13	35	....	51	1	41	2	13	53	55	104	94	462
Cocoanuts	9	....	12	....	....	1	....	....	....	....	....	....	22
Corn	....	3	....	....	....	2	3	....	....	2	1	77	88
Fruit	2	2	2	1	2	7	3	3	....	....	3	9	34
Garlic	7	5	15	71	61	112	38	25	44	37	3	11	429
Grapefruit	1	3	1	2	1	5	....	....	3	1	....	....	17
Horse Radish	2	1	....	1	1	....	....	....	....	1	1	1	8
Lemons	2	1	....	....	....	1	....	....	....	....	....	2	6
Limes	....	....	1	....	....	....	....	....	....	....	....	....	1
Ginger	24	13	13	25	13	26	12	7	28	43	22	16	242
Nuts	3	2	3	10	8	19	16	10	18	50	27	66	232
Onions	6	9	4	10	203	15	21	3	10	10	9	7	307
Oranges	12	4	14	9	12	14	3	6	....	8	5	20	107
Olives	3	2	....	2	4	2	....	....	....	....	....	5	18
Peas	....	....	1	....	1	....	....	....	....	1	....	10	13
Peanuts	120	117	100	277	2	70	60	196	10	151	578	259	1,940
Pears	2	1	....	....	....	....	....	....	2	....	....	....	5
Persimmons	....	....	....	....	....	....	....	....	....	....	5	1	6
Plants	2	5	....	8	3	22	1	....	8	3	11	9	72
Plums	....	....	....	....	....	....	....	....	4	....	....	....	4
Pomelo	3	1	5	....	1	....	....	....	....	....	....	1	11
Seeds	98	64	35	34	48	15	25	48	20	173	45	107	712
Sandpears	....	2	2	6	1	4	1	4	3	5	4	9	41
Potatoes	3	323	2	3,022	400	5,027	....	852	5	420	30	1	10,085
Whitenuts	2	8	4	6	....	....	....	2	....	11	46	18	97
Sweet Potatoes	15	15	45	29	9	20	....	....	3	5	9	19	169
Tangerines	16	12	5	1	....	....	....	....	1	....	5	9	49
Taro	1	....	4	3	....	1	....	2	5	3	....	....	19
Yams	17	24	45	45	63	60	44	18	72	72	80	60	600
Vegetables	....	....	1	....	6	....	5	....	1	6	6	12	37
Bulbs	16	17	1	3	1	1	....	1	40	38	24	7	149
Totals	487	845	394	3,700	926	5,538	331	1,282	443	1,141	1,145	999	17,231

APPENDIX NO. 11.

FRUITS AND VEGETABLES RECEIVED IN HILO DURING 1919.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	625	961	150	49	....	....	413	352	....	612	1,835	955	5,952
Apricots	....	....	....	....	....	2	15	....	....	....	....	....	17
Artichokes	....	....	....	2	4	1	1	1	....	....	....	....	9
Beans	....	15	....	24	202	38	15	8	....	....	....	481	783
Asparagus	....	....	....	2	....	....	....	....	....	....	....	....	2
Cauliflower	....	....	....	5	3	....	6	9	....	3	6	5	37
Celery	....	....	....	3	....	6	5	8	....	5	4	4	35
Cherries	....	....	....	....	13	42	15	....	....	....	....	....	70
Cranberries	....	....	....	....	....	....	....	....	....	....	....	1	1
Fruit	....	....	....	....	....	....	....	....	....	....	18	....	18
Garlic	....	8	2	2	2	2	16	15	....	19	12	5	83
Grapefruit	6	15	5	21	16	9	6	22	....	6	18	6	130
Grapes	....	....	....	....	....	....	65	45	....	40	120	25	295
Lemons	5	36	9	29	20	10	29	35	....	26	35	11	245
Lettuce	....	....	....	....	....	....	....	....	....	....	1	1	2
Megs	....	....	....	....	....	30	51	....	....	46	17	....	144
Nuts	....	5	....	....	....	2	....	....	....	....	104	....	111
Onions	502	421	170	264	357	181	246	152	....	472	794	435	3,994
Oranges	57	396	200	236	390	325	364	183	....	256	820	473	3,700
Peas	....	....	....	....	....	....	1	1	....	....	....	5	7
Peaches	....	....	....	....	....	54	32	61	....	28	27	....	202
Rhubarb	....	....	....	2	1	1	1	....	....	....	....	8	13
Pears	....	....	....	....	....	....	6	12	....	....	26	....	44
Persimmons	....	....	....	....	....	....	....	....	....	22	90	....	112
Plants	....	....	3	5	3	....	....	3	2	....	2	1	19
Plums	....	....	....	....	....	65	42	74	....	5	....	....	186
Seeds	....	7	2	12	6	4	3	17	11	7	4	118	191
Sprouts	....	....	....	....	....	....	....	....	....	....	1	....	1
Potatoes	1,043	850	850	988	1,045	845	519	396	....	781	1,616	946	9,979
Tangerines	125	60	....	....	26	....	....	....	....	....	185	215	561
Turnips	2	2	2	2	....	....	....	....	....	....	1	....	9
Vegetables	....	....	....	1	2	....	....	5	....	....	....	8	16
Bulbs	....	....	....	4	....	....	....	....	....	....	....	....	4
Totals	2,365	2,876	1,393	1,651	2,090	1,587	1,830	1,450	18	2,328	5,686	3,703	26,972

APPENDIX NO. 12.

FRUITS AND VEGETABLES RECEIVED IN HILO DURING 1920.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec	Total
Apples	260	145	175	235	115	115	273	489	809	2,163	1,529	1,996	8,304
Apricots	....	....	....	....	....	58	33	8	....	....	....	....	94
Artichokes	....	....	....	....	1	3	2	....	....	....	....	....	6
Beans	....	7	16	20	8	42	....	....	....	27	28	14	162
Cauliflower	6	5	5	10	12	11	5	7	8	11	5	12	97
Celery	8	4	4	12	4	6	6	4	7	11	8	16	90
Cherries	....	....	....	....	25	107	55	....	....	....	....	....	187
Cranberries	....	....	....	....	....	....	....	....	....	....	1	2	3
Fruit	....	....	....	....	....	....	....	....	....	30	21	5	56
Garlic	1	1	4	13	9	8	3	3	5	17	9	7	78
Grapefruit	7	13	10	27	30	27	37	20	16	45	44	30	306
Grapes	20	....	....	....	....	....	35	78	81	596	120	183	1,113
Lemons	12	46	17	46	62	76	62	16	24	97	52	32	542
Lettuce	1	....	....	....	....	....	....	....	....	....	....	....	1
Megs	....	....	....	....	....	85	41	32	25	23	....	....	206
Melons	....	....	....	....	....	....	....	2	....	11	2	....	15
Nectarines	....	....	....	....	....	....	37	26	....	....	....	....	63
Nuts	....	....	....	....	1	1	....	....	....	7	35	6	50
Onions	42	327	423	266	179	235	325	375	696	1,217	484	296	4,865
Oranges	213	184	400	660	554	635	721	291	318	673	515	781	5,945
Peas	....	....	....	....	....	....	5	....	....	....	3	15	23
Peaches	....	....	....	....	....	76	81	54	37	22	12	....	282
Rhubarb	....	....	....	1	....	....	....	....	....	....	....	....	1
Pears	12	....	....	....	....	....	6	59	39	96	29	12	253
Persimmons	....	....	....	....	....	....	....	....	....	119	48	43	210
Plants	1	3	5	4	3	....	....	....	....	....	....	3	19
Plums	....	....	....	....	....	45	120	82	36	130	10	....	423
Prunes	....	....	....	....	....	....	....	5	....	....	....	....	5
Seeds	3	5	8	19	23	10	10	6	4	....	10	9	107
Potatoes	283	695	840	868	320	405	208	562	905	1,690	618	640	8,034
Tangerines	12	....	....	....	....	....	....	....	....	....	9	207	228
Turnips	1	1	4	5	3	5	3	....	....	....	....	....	22
Totals	882	1,436	1,911	2,186	1,349	1,945	2,068	2,119	3,010	6,985	3,590	4,309	31,790

APPENDIX NO. 18.

FRUITS AND VEGETABLES RECEIVED IN KAHULUI DURING 1919.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	....	337	195	85	....	....	51	50	65	185	285	235	1,488
Apricots	....	....	....	....	....	11	21	....	....	....	....	....	32
Artichokes	....	....	....	1	2	2	....	....	....	....	....	....	5
Beans	....	....	....	....	....	....	....	....	....	....	....	15	15
Cauliflower	....	....	....	1	4	1	1	3	2	2	3	5	22
Celery	....	....	....	....	....	1	5	7	4	2	10	8	37
Cherries	....	....	....	....	25	10	5	....	....	....	....	....	40
Cranberries	....	....	....	....	....	....	....	....	....	....	2	1	3
Fruit	....	....	....	....	....	....	....	....	....	....	....	33	33
Garlic	....	....	....	....	....	2	3	2	3	2	9	5	26
Grapefruit	....	9	3	12	2	9	7	8	8	....	6	8	72
Grapes	....	....	....	....	....	....	....	14	44	34	30	19	141
Lemons	....	11	3	11	5	8	10	11	7	14	14	13	107
Megs	....	....	....	....	....	5	9	10	9	3	3	2	41
Nectarines	....	....	....	....	....	....	....	15	....	....	....	....	15
Onions	....	260	130	48	45	100	35	60	110	163	255	115	1,321
Oranges	....	40	8	128	50	60	100	75	55	57	58	155	786
Peas	....	....	....	2	....	....	....	....	....	....	....	....	2
Peaches	....	....	....	....	....	12	21	36	14	5	....	....	88
Rhubarb	....	....	....	1	2	2	2	2	....	....	....	....	9
Pears	....	....	....	....	....	....	....	25	10	2	12	19	68
Persimmons	....	....	....	....	....	....	....	....	....	....	5	....	5
Plants	....	....	....	....	....	....	....	....	....	....	1	1	2
Plums	....	....	....	....	....	10	11	34	30	4	....	....	89
Potatoes	....	535	100	220	160	225	80	105	120	225	430	360	2,560
Tangerines	....	....	....	10	....	....	....	....	....	....	....	10	20
Vegetables	....	....	....	....	3	....	....	....	....	....	....	....	3
Totals	....	1,192	489	519	298	458	361	457	481	698	1,123	1,004	7,080

APPENDIX NO. 14.

FRUITS AND VEGETABLES RECEIVED IN KAHULUI DURING 1920.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Apples	285	135	70	80	10	....	62	275	485	735	1,720	859	4,716
Apricots	....	....	....	....	....	9	4	1	....	....	....	....	14
Artichokes	....	1	....	2	1	1	2	....	....	....	....	....	7
Asparagus	....	....	....	1	....	1	....	....	....	....	....	....	2
Cauliflower	1	2	1	2	3	3	12	6	6	6	8	10	60
Celery	2	2	1	2	2	....	8	9	10	13	14	9	72
Cherries	....	....	....	....	....	9	5	....	....	....	....	....	14
Cranberries	....	....	....	....	....	....	....	....	....	....	....	1	1
Fruit	....	....	....	....	....	....	....	2	....	....	....	....	2
Garlic	3	8	6	1	1	....	2	8	5	2	1	4	41
Grapefruit	7	9	8	6	7	13	19	17	11	11	13	10	131
Grapes	25	6	....	....	....	....	4	18	40	94	70	55	312
Lemons	10	7	13	7	10	18	25	16	13	11	19	18	162
Megs	....	....	....	....	....	7	12	15	14	3	....	....	51
Nectarines	....	....	....	....	....	....	4	20	....	....	....	....	24
Onions	115	80	135	125	140	115	120	192	270	350	820	145	2,607
Oranges	125	98	178	100	115	290	420	380	375	440	70	430	3,021
Peaches	....	....	....	....	....	5	23	24	20	14	....	....	86
Rhubarb	....	1	....	2	1	3	5	1	2	2	....	2	19
Pears	10	10	....	....	....	....	4	9	11	23	23	38	128
Persimmons	....	....	....	....	....	....	....	....	....	10	20	10	40
Plants	2	....	....	....	....	....	....	....	....	....	....	....	2
Plums	....	....	....	....	....	....	10	38	15	....	....	....	63
Prunes	....	....	....	....	....	....	....	2	....	....	....	....	2
Seeds	1	....	....	....	....	....	....	....	....	....	....	....	1
Potatoes	400	360	280	150	60	60	75	170	460	390	455	599	3,459
Tangerines	22	....	....	....	....	....	....	....	....	....	....	61	88
Totals	1,008	719	692	478	350	534	816	1,203	1,737	2,104	3,233	2,246	15,120

APPENDIX NO. 15.
INTER-ISLAND INSPECTION
1919.

Month	Vessels Inspected	PASSED							REJECTED					
		Fruit	Plants	Vegetables	Sugar Cane Shipped by H. S. P.A.	Pineapple Shoots	Seeds	Total	Fruit	Plants	Sugar Cane	Total	Total Inspected
January	59	90	59	927	...	....	..	1,076	5	18	..	23	1,099
February	62	27	101	829	...	....	..	957	10	3	..	13	970
March	62	44	112	690	...	....	..	846	4	5	..	9	855
April	61	28	123	773	14	....	..	938	5	4	..	9	961
May	56	51	149	775	13	....	..	988	7	2	..	9	997
June	58	112	132	508	12	....	..	764	..	14	1	15	779
July	60	138	147	772	85	....	6	1,148	5	33	..	38	1,186
August	56	153	268	1,053	176	....	16	4,085	..	4	..	4	4,089
September	60	160	128	924	19	4,928	14	6,173	..	17	3	20	6,193
October	56	178	147	622	2	6,764	22	7,735	..	6	1	7	7,742
November	54	206	148	905	7	8,200	..	9,466	..	18	..	18	9,484
December	60	235	138	1,258	21	5,430	21	7,103	..	16	1	17	7,120
Total	704	1,422	4,071	10,036	349	25,322	79	41,279	36	140	6	182	41,461

APPENDIX NO. 16.
INTER-ISLAND INSPECTION
1920.

Month.	Vessels Inspected	PASSED							REJECTED					
		Fruit	Plants	Vegetables	Sugar Cane	Pineapple Shoots	Seeds	Taro	Total Passed	Fruit	Plants	Vegetables	Sugar Cane	Total Rejected	Total Inspected
January	58	159	80	351	3	...	22	583	1,198	..	6	..	..	6	1,204
February	55	187	91	328	19	825	20	517	1,987	..	6	3	..	9	1,996
March	61	242	71	376	80	1,155	10	607	2,541	..	13	..	8	21	2,562
April	58	149	79	305	16	2,837	18	444	3,848	..	39	..	..	39	3,887
May	59	339	115	378	..	10	16	508	1,366	1	23	..	..	24	1,390
June	56	342	105	390	21	...	3	583	1,444	..	51	..	..	51	1,495
July	62	251	130	331	74	...	1	540	1,327	..	55	..	4	59	1,386
August	56	260	119	412	78	2,280	4	623	3,776	4	32	..	2	38	3,814
September	54	253	109	277	56	4,685	12	610	6,002	..	74	..	..	74	6,076
October	56	424	127	341	44	8,607	6	488	10,037	1	64	..	..	65	10,102
November	57	170	106	199	..	2,520	4	221	3,220	5	20	..	1	26	3,246
December	53	151	70	249	1	10,658	..	227	11,356	..	17	..	1	18	11,374
Total	685	2,927	1,202	3,937	392	33,577	116	5,951	48,102	11	400	3	16	430	48,532

APPENDIX NO. 17.

LIST OF INSECT PESTS INTERCEPTED BY INSPECTION DURING 1919 and 1920.

Polybia sp. orchid, baggage, Chile.
Belostoma sp., medicinal, baggage, China.
Hydrophilid sp., water beetle, medicinal, baggage, China.
Ants (sp. undet.) citrus tree, baggage, Japan.
Tussock moth, citrus tree, baggage, Japan.
Epiphragmophora sp. ex moss, violet plant, baggage, California.
Lepidopterous larvae, chrysanthemum roots, baggage, Japan.
Mantis egg masses, juniper, baggage, Japan.
Spermophagus pectoralis, cowpeas, mail, Guadaloupe.
Taro disease, taro, mail, Porto Rico.
Milliped, orchid, cargo, Philippines.
Centipede, orchid, cargo, Philippines.
Ants (2 sp.), orchid, cargo, Philippines.
Taro rot, taro, mail, Porto Rico.
Fungus disease, grapefruit, Florida.
Elaterid larva, orchid, cargo, Philippines.
Cerambycid larvae, fig tree, cargo, Japan.
Cnidocampus flavescens, camellia, cargo, Japan.
Dipterous larva, palm, cargo, Japan.
Araocerus sp., yams, mail, Philppines.
Ants (sp. undet.), yams, mail, Philippines.
Lepidopterous larva, Cryptomeria, cargo, Japan.
Lepidopterous pupa, Cryptomeria, cargo, Japan.
Earwigs, Cryptomeria, cargo, Japan.
Bruchus pisorum, peas (dried), mail, Japan.
Mites, mango seed, mail, Manila.
Aphis, gladiolus bulbs, mainland mail.
Blastophaga sp., Ficus pseudopalma, mail, Manila.
Cicada pupal-skins, medicinal, cargo, China.
Catorama mexicana, herbs and seeds, mail, Japan.
Lepidopterous larva, cucumber seed, mail, Japan.
Land crab, baggage of crew, Fanning Islands.
Cocoanut rot, cocoanut stump, cargo, Samoa.
Ants (sp. undet.), cocoanut plants, Fanning Island cargo.
Mites, betel nuts, mail, Philippines.
Lepidopterous larva, palm seeds, mail, Australia.
Calandra oryzae, loquat seed, mail, Japan.
Coccoons, mail, Japan.
Lepidopterous larva, sweet potato, cargo, Japan.
Xyloborus sp., Ensideroxylon zulogeri (seed), cargo, Java.
Weevil larvae, ficus seed, cargo, Java.
Weevils (sp. undet.), Taephrusia candida (seed), cargo, Java.
Weevils (sp. undet.), seeds, mail, Japan.
Weevils (sp. undet.), chestnuts, baggage, Japan.
Lepidopterous larvae, betel nuts, mail, Philippines.
Laspeyresia pomonella, apple box, cargo, California.
Plant lice, caladium, cargo, China.
Diseased potato, mail, New Zealand.
Bruchid sp., Acacia seed, mail, Egypt.
Diptera (remnants), grass tassels, mail, Japan.
Potato scab, potatoes, cargo, California.
Hymenoptera (remnants), grass tassels, mail, Japan.
Pseudococcus maritimus, lemon verbena, mail, California.

Spot disease of cocoanut, cocoanut, baggage, Philippines.
Pheidole sp. (ant), fern plant and peat, cargo, Washington Island.
Aphis (sp. undet.), rose bushes, cargo, California.
Parlatoria sp. (scale), Paulonia imperialis, baggage, Japan.
Pseudococcus sp., orchids, express, New Jersey.
Moth larvae, herbs, baggage, China.
Mites, seed, mail, Java.
Metamasius ritchiei, pineapple weevil, pineapple suckers, mail, Mexico.
Pseudococcus sp., pineapple suckers, mail, Mexico.
Stigmaeus floridanus, mite, pineapple suckers, mail, Guatemala.
Potato scab, potatoes, cargo, California.
Monomorium sp., carnation plants, mail, California.
Pectinophora gossypiella, cotton seed, mail, Japan.
Ant (sp. undet.), yams, cargo, China.
Aphis, geraniums, express, California.
Mites, yams, cargo, China.
Lepidosaphes ficus, sandpear, baggage, Japan.
Prenolepis sp. (ants), betel nuts, mail, Philippines.
Prenolepis sp. (ants), packing material, cargo, Fanning Islands.
Opatrum seriatum, packing material, cargo, Fanning Islands.
Pseudococcus sp., orchid, baggage, Jamaica.
Chionaspis sp., orchid, baggage, China.
Peach moth, peaches, cargo, California.
Drosophila sp., potatoes, ship's stores, Canal Zone.
Apiochaeta atlantica, potatoes, ship's stores, Canal Zone.
Rhegmoclema atrata, potatoes, ship's stores, Canal Zone.
Musca domestica, potatoes, ship's stores, Canal Zone.
Aphis, dahlia bulbs, mail, California.
Ants, timber, cargo, Japan.
Acrito chaeta pulvinata, betel nuts, mail, Philippines.
Thyrodopteryx sp., bag worm, hardwood log, baggage, Orient.
Pseudococcus pseudonipae, palms, express, Pennsylvania.
Drosophila sp., decaying carrots, ship's stores, Japan.
Drosophila sp., dry decaying onions, ship's stores, Japan.
Phora sp., decaying onions, ship's stores, Japan.
Tortricid moth, umbrella pine, ship's plants, Japan.
Lepidosaphes cocculi, orchid, baggage, China.
Ephestia elutella, shelled peanuts, cargo, Orient.
Laemophlaeus minutus, shelled peanuts, cargo, Orient.
Necrobia rufipes, shelled peanuts, cargo, Orient.
Tribolium ferrugineum, shelled peanuts, cargo, Orient.
Carpophilus sp., shelled peanuts, cargo, Orient.
Bruchid sp., algaroba seed, mail, Texas.
Bruchus pisorum, dried peas, mail, Japan.
Weevils, puffed rice packing, baggage, Manila.
Psyllid sp. (undet.), ficus seed, mail, Fiji.
Blastophaga sp., ficus seed, mail, Fiji.
Grain smut, barley, mail, Japan.
Lassioderma serricorne, dried herbs, baggage, China.
Diabrotica sorror, Chinese cabbage, cargo, California.
Phorbia fusciceps, Chinese cabbage, cargo, California.
Chlorops sp., Chinese cabbage, cargo, California.
Phora sp., decaying potatoes, ship's stores, Japan.
Carpophilus marginellus, dry onions, ship's stores, China.
Pseudococcus sp., persimmon fruit, baggage, Japan.
Ant (Specie undet.), persimmon fruit, baggage, Japan.
Ant (sp. undet.), bulbs, baggage, Japan.

Bruchus pisorum, dried peas, mail, Japan.
Araeocerus fasciculatus, dry beans, baggage, Orient.
Carabid, dry beans, baggage, Orient.
Tenebroides mauritanicus, cooked rice, mail, Philippines.
Undetermined moth, mallow seed pod, baggage, Philippines.
Weevil, dry cocoanut, cargo, Palmyra Island.
Lepidosaphes ficus, sandpear, baggage, Orient.
Weevil larvae, chestnuts, baggage, Japan.
Moth larvae, Pterocarpus macrocarpus, seed, mail, Siam.
Pseudococcus Krauhniae, pumpkin, ship's stores, Japan.
Drosophila sp., diagon, ship's stores, Japan.
Ant (sp. undet.), pot plant, baggage, California.
Ant (sp. undet.), pot plant, baggage, Japan.
Drosophila sp., package of fruit, mail, Japan.
Hemichionaspus aspidistrae, citrus fruit, baggage, Japan.
Moth (undet.), seed of snuff box vine, mail, Fiji.
Melanostoma stegenum, Chinese cabbage, cargo, California.
Physokermes, Abies sp., mail, Vermont.
Drosophila sp., citrus fruit, mail, Japan.
Carpophilus sp., dry onions, ship's stores, Chile.
Drosophila sp., dry onions, ship's stores, Chile.
Drosophila sp., dry onions, ship's stores, Japan.
Bruchid sp., tree seed, baggage, Jamaica.
Bruchid sp., Bauhinia variegata seed, baggage, Jamaica.
Bruchid sp., Bauhinia variegata seed, baggage, Canal Zone.
Bruchid sp., tree seed, baggage, Tobago.
Bruchid sp., Mucoma sp., seed, baggage, Tobago.
Bruchid sp., Cassia sp., baggage, Canal Zone.
Anthribid sp., Attalea sp., palm seed, baggage, Canal Zone.
Bruchid sp., Cassia sp., baggage, Canal Zone.
Bruchid sp., Cassia sp., baggage, Canal Zone.
Bruchid sp., Cassia sp., baggage, Canal Zone.
Bruchid sp., Maximilliania sp., seed, baggage, Canal Zone.
Bruchid sp., Attalea sp., palm seed, baggage, Canal Zone.

APPENDIX NO. 18.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY
RULE XX—DIVISION OF PLANT INSPECTION

Rules and Regulations of the Board of Commissioners of Agriculture and Forestry Concerning the Control of Insect Pests and Plant Diseases, Repealing Rule XVII of the Board of Commissioners of Agriculture and Forestry.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rules and regulations for the purpose of controlling insect pests and plant diseases in the Territory of Hawaii:

Section 1. No infested or infected plant, fruit, melon, vegetable, or

root, shall be carried, transported or shipped from any one island in this Territory to any other island in this Territory, if the infestation or infection is of such a character or extent as to endanger the agriculture or plant life of the other island.

Section 2. No sugar cane or other plant, or part thereof, shall be carried, transported, or shipped from the island of Oahu to any other island in this Territory unless it has been first examined and, when found necessary, fumigated by, or under the supervision of, the Chief Plant Inspector or his assistants, and properly tagged and certified by any such officer, to the best of his knowledge, to be free from insect pests and plant diseases of danger to the agriculture or plant life of the other islands.

Section 3. No taro, lily root, tuber, or root shall be carried, transported or shipped from the island of Oahu to any other island in this Territory unless it is free from soil, except as hereinafter provided, and has been first examined and, when found necessary, fumigated by or under the supervision of the Chief Plant Inspector or his assistants and properly tagged and certified by any such officer, to the best of his knowledge, to be free from insect pests and plant diseases of danger to agriculture or plant life of the other islands.

Section 4. No soil, earth, or sand attached to any plant, except as hereinafter provided, or any other soil, earth, or sand (except clean beach sand in bulk), shall be carried, transported, or shipped from the island of Oahu to any other island in this Territory, except that soils, in sufficient quantity to provide inoculation with beneficial soil organisms, which have first been screened or thoroughly examined by the Chief Plant Inspector or his assistants, may be so carried, transported, or shipped when properly tagged and certified by any such officer, to the best of his knowledge, to be free from insect pests and plant diseases of danger to the agriculture or plant life of the other islands.

Section 5. Upon written application to the Chief Plant Inspector and upon the approval of the Board of Commissioners of Agriculture and Forestry, a special permit may be issued by the Chief Plant Inspector to ship from the island of Oahu to any other island in the Territory a limited number of plants in soil when it has been shown in said application that such plants are novelties and are of value to agriculture, horticulture, or forestry and that such plants cannot be successfully transported in any other manner; provided, however, that such plants have, to the knowledge and satisfaction of the Chief Plant Inspector, been grown in sterilized soil in quarantine or transplanted into sterilized soil and held, up to the time of shipment, under such conditions as would provide reasonable precautions against infestation by insect pests or infection by plant diseases. The Chief Plant Inspector may, in his discretion, subject such shipment to fumigation.

Section 6. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars ($500.00), as provided by Section 529, Revised Laws of Hawaii of 1915.

Section 7. Rule XVII of the Board of Commissioners of Agriculture and Forestry is hereby repealed.

Section 8. This rule shall take effect on June 1, 1919.

Approved:

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, Territory of Hawaii, May 26, 1919.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY AMENDMENT TO RULE XX—DIVISION OF PLANT INSPECTION

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Section 5 of Rule XX of the Division of Plant Inspection, approved May 26, 1919, concerning the control of insect pests and plant diseases in the Territory of Hawaii, so as to read as follows:

Section 5. Plants and trees for forestry, horticultural and agricultural purposes may be shipped in reasonable quantities from the island of Oahu to any other island in the Territory under a special permit, when said plants and trees have been grown in sterilized soil under conditions and for a period satisfactory to the Chief Plant Inspector, or have been transplanted to sterilized soil prior to shipment and properly housed to prevent fresh contamination, provided that all the operations in question have been carried out at the expense of the shipper under the direction of, and subject to the approval of the Chief Plant Inspector, and provided that said plants and soils are apparently free from infestation or infection which bears potential danger to the agricultural or plant life of the other islands.

This amendment shall take effect upon its approval by the Governor.

Approved this 1st day of June, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

APPENDIX NO. 19

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY

Further Amendment to Rule XVIII of the Division of Entomology of the Board of Commissioners of Agriculture and Forestry Concerning the Control of Fungus Diseases on Pineapples.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby further amends Rule XVIII of the Division of Entomology concerning the control of fungus diseases on pineapples in order to permit the shipment of pineapple fruit, crowns, slips and suckers from Honolulu to ports on the Islands of Hawaii and Molokai so that the said rule shall read as follows:

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rule and regulation for the purpose of preventing the spread of a fungus disease upon pineapples which has made its appearance upon the Islands of Kauai and Oahu:

Section 1. All persons and corporations are hereby prohibited from carrying, transporting, or shipping from the Island of Kauai and Oahu to any other Island in this Territory any pineapple fruit, pineapple plant, or pineapple sucker; provided, however, that clean pineapple fruit, crowns, slips and suckers may be shipped from Honolulu to ports on the Islands of Hawaii and Molokai.

Section 2. No pineapple fruit, pineapple plant, or pineapple sucker shipped from any port of the Islands of Kauai and Oahu to any other port in this Territory shall be allowed to be landed, excepting clean pineapple fruit, crowns, slips and suckers shipped from Honolulu to ports on the Islands of Hawaii and Molokai. Inspectors and other duly authorized agents of the Board of Agriculture and Forestry are hereby empowered to examine and inspect all freight, baggage, and belongings arriving at any port of the Territory from the Islands of Kauai and Oahu and to destroy any and all pineapple fruits, plants or suckers found among such freight, baggage or belongings, excepting clean pineapple fruit, crowns, slips and suckers arriving at ports on the Islands of Hawaii and Molokai from Honolulu.

Section 3. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars ($500.00) as provided by Section 529 of the Revised Laws of Hawaii of 1915.

Section 4. This Rule, as amended, shall take effect upon its approval by the Governor.

Approved this 18th day of July, 1919.

C. J. McCARTHY,
Governor of Hawaii.

APPENDIX NO. 20

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY

Further Amendment to Rule I of the Division of Plant Inspection of the Board of Commissioners of Agriculture and Forestry.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby further amends Rule I of the Division of Plant Inspection to read as follows:

"Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of fruit flies and insects, their eggs, larvae or pupae, and all diseases of plants, fruits, or other vegetation of value, all persons, companies and corporations are hereby prohibited from introducing, importing or bringing, in baggage or otherwise, into the Territory of Hawaii, or into any of its ports for the purpose of debarkation into the said Territory, any fresh fruit from East or West Indies, Asia, Australasia, Oceanica, Malaysia, Mexico, Central and South America; provided, however, that fresh apples may be imported into the Territory of Hawaii direct from New Zealand in cold storage only, if they are free from insect pests and plant diseases, and are accompanied by a govern-

ment certificate declaring that the apples have been grown in New Zealand and are shipped free from insect pests and plant diseases, and are also accompanied by a government certificate declaring that they have not and will not come in contact with Australian grown fruit on the voyage to the Territory of Hawaii."

Section 2. (a) Provided that a special permit has been granted by the Federal Horticultural Board of Washington, D. C., in accordance with its Form 207-3, and further provided that such permit is actually in the possession of the Chief Plant Inspector of the Territory of Hawaii at the time of entry, only bona-fide "Novelties," consisting of plants not of a succulent nature, if free from sand, soil or earth; scions and buds of trees; rose stocks for propagation; nuts, including palm seeds, for propagation; seeds of fruit, forest, ornamental and shade trees; seeds of deciduous and evergreen ornamental shrubs and of hardy perennial plants, may be imported into the Territory (through the port of Honolulu only) from any foreign country. All such importations, however, at the time of their entry for introduction shall be subjected to inspection and examination by the Chief Plant Inspector or his assistants and if found attacked by plant diseases, insect pests or their larvae, shall be seized and immediately burned. The Chief Plant Inspector may in his discretion and as a precautionary measure, fumigate any or all importations as aforesaid. Provided, however, that lily bulbs, lily of the valley, narcissus, hyacinths, tulips, and crocus may be imported into the Territory of Hawaii from Europe only, and narcissus and liliums may be so imported from Japan and China only after the necessary permit has been obtained for such importation from Europe, China, or Japan, from the Federal Horticultural Board of Washington, D. C., and all plant products to be used for medicinal, food, or manufacturing purposes may be imported into the Territory from any state, territory, or foreign country, subject, however, to all the conditions as to inspection and freedom from pests as hereinabove provided.

(b). For the purpose of this Rule wherein it governs plant importations from foreign countries, the definition of "Plant Novelties" (not including succulent plants as aforesaid) and of "Propagating Stock" shall be in accordance with the "informational data" given by the Federal Horticultural Board of Washington, D. C., in its said Form 207-3.

(c). All persons and corporations are hereby prohibited from removing or taking or attempting to remove or take, any of the articles aforementioned from either ship, wharf or landing place without first having notified the Division of Plant Inspection of the arrival of said article or articles and having received written permission from the duly authorized officer to remove or take same.

Section 3. All fruits, vegetables, plants, parts of plants, bulbs, roots or tubers, seeds, grains or cereals from the United States of America and the Dominion of Canada that are not prohibited under rules and regulations of the Federal Horticultural Board of Washington, D. C., may be introduced, imported or brought into the Territory of Hawaii either by freight, express or as packages of passengers, provided, however, that all such fruits, vegetables, plants, parts of plants, bulbs, roots, seeds, grains and cereals are free from pests and diseases. All persons importing, introducing, or bringing into the Territory of Hawaii any fruits, vegetables, plants, or parts of plants, bulbs, roots or tubers, seeds, grains and cereals must present the same to or notify the Chief Plant Inspector of the Board of Agriculture and Forestry before landing any of these articles.

Section 4. If any fresh fruits, vegetables, plants, cuttings, scions, buds, bulbs, roots or tubers, seeds, grains, or cereals shall be imported, introduced or brought in baggage or otherwise into the Territory of

Hawaii, or into any of its ports for the purpose of debarkation into said Territory, contrary to law or this regulation, the same shall, in the discretion of the Board of Commissioners of Agriculture and Forestry or its duly authorized agent, officer or inspector, be immediately seized and destroyed or deported at the expense of the importer or introducer, and the person or persons or corporation introducing or importing the same shall be guilty of a misdemeanor and shall be liable to the penalty or penalties provided by law.

Section 5. This rule, as amended, shall take effect upon its approval by the Governor."

Approved this 31st day of October, 1919.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

APPENDIX NO. 21

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY RULE XXI—DIVISION OF PLANT INSPECTION

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry concerning the Control of Certain Insect and Plant Pests.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rules and regulations for the purpose of controlling certain insect pests and plant pests in the Territory of Hawaii:

Section 1. No ginger plant, or part thereof, no fern plant or part thereof, and no Spanish moss, *(Tillandsia usneoides)*, otherwise known as Florida moss or old man's beard, shall be carried, transported, or shipped from any one island in this Territory to any other island in this Territory, except by special written permit from the Board of Agriculture and Forestry.

Section 2. No ginger plant or part thereof, no fern plant or part thereof, and no Spanish moss shall be transported in any manner from one part or locality of any island to another part or locality of the same island, except by special written permit from the Board of Agriculture and Forestry.

Section 3. Inspectors and other duly authorized agents of the Board of Agriculture and Forestry are hereby empowered to examine and inspect all freight, baggage, and belongings leaving or arriving at any port of the Territory or being transported from one part or locality of any island to another part or locality of the same island and to destroy any and all ginger plants or parts thereof, any and all fern plants or parts thereof, and any and all Spanish moss found among or in such freight, baggage and belongings.

Section 4. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not

to exceed Five Hundred Dollars ($500.00) as provided by Section 529 of the Revised Laws of 1915.

Section 5. This rule shall take effect upon its approval by the Governor.

Approved this 25th day of February, 1920.

CURTIS P. IAUKEA,
Acting Governor of Hawaii.

Honolulu, T. H.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY RULE XXI—DIVISION OF PLANT INSPECTION

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry Concerning the Control of Certain Insect and Plant Pests.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule XXI of the Division of Plant Inspection, approved February 25, 1920, concerning the control of certain insect pests and plant pests in the Territory of Hawaii, so as to read as follows:

"Section 1. No white ginger root, (*Hedychium coronarium*), no fern plant or part thereof, and no Spanish moss, (*Tillandsia usneoides*), otherwise known as Florida moss or old man's beard, shall be carried, transported, or shipped from any one island in this Territory to any other island in this Territory, except by special written permit from the Board of Agriculture and Forestry.

Section 2. No white ginger root, no fern plant or part thereof, and no Spanish moss shall be transported in any manner from one part or locality of any island to another part or locality of the same island, except by special written permit from the Board of Agriculture and Forestry.

Section 3. Inspectors and other duly authorized agents of the Board of Agriculture and Forestry are hereby empowered to examine and inspect all freight, baggage, and belongings leaving or arriving at any port of the Territory or being transported from one part or locality of any island to another part or locality of the same island and to destroy any and all white ginger roots, any and all fern plants or parts thereof, and any and all Spanish moss found among or in such freight, baggage and belongings.

Section 4. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars ($500.00) as provided by Section 529 of the Revised Laws of 1915.

Section 5. This rule as amended shall take effect upon its approval by the Governor."

Approved this 7th day of May, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

APPENDIX NO. 22

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY RULE XII—DIVISION OF PLANT INSPECTION

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry Concerning the Control of Insects and Plant Diseases in the Territory of Hawaii.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule XII of the Board, approved December 30, 1911, concerning the control or eradication of injurious insects or other injurious animals or dangerous plant diseases or insects, or other animals or plant diseases likely to become injurious to trees, plants, or other vegetation of value and the fruit thereof in the Territory of Hawaii, so as to read as follows:

"Section 1. All officers, inspectors or other duly appointed agents of the Board of Agriculture and Forestry are hereby authorized and empowered to enter public or private premises, excepting private houses, at all reasonable times to search for injurious insects or other injurious animals or dangerous plant diseases, and to carry out the orders of the Board in relation thereto and they shall not be holden guilty of any misdemeanor by so doing nor shall they be personally liable in damages except for acts beyond the scope of their authority or due to their own negligence.

Section 2. Whenever any injurious insect or other injurious animal or dangerous plant disease is discovered on any premises, the officer, inspector or other duly appointed agent of the Board charged with that duty, shall notify the owner of the same and prescribe a method or methods of controlling or eradicating the said insect or other animal or plant disease, and the owner, upon receipt of such notification shall do and perform the prescription of said officer, inspector or other duly authorized agent, relative to its control or eradication, or upon failure to so do and perform within a reasonable time after notification, the said officer, inspector or duly authorized agent may and is hereby authorized and empowered to enter upon said premises to do and perform the same or cause the same to be done and performed.

Section 3. All officers, inspectors and other duly authorized agents of the Board are hereby authorized and empowered to seize and destroy any soil, nursery stock, tree, sugar cane, shrub, plant, flower, vine, cutting, graft, scion, bud, seed, root, fruit pit, fruit, vegetable, leaf, nut or other vegetable growth or other substance, and any box, barrel, package or packing material or containers in which said articles or any of them have been transported or contained, which is or may be infected or infested with or likely to assist in the transmission or dissemination of any injurious insect or insects or injurious animal or animals or dangerous plant disease, or diseases found in any shipment in any part of the Territory.

Section 4. Any person, firm or corporation violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be

punished by a fine not to exceed Five Hundred Dollars ($500.00), as provided by Sec. 529 of the Revised Laws of Hawaii of 1915.

Section 5. This rule, as amended, shall take effect upon its approval by the Governor.''

Approved this 26th day of May, 1920.

C. J. McCARTHY,
Governor af Hawaii.

Honolulu, T. H.

APPENDIX NO. 23

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY RULE XXII—DIVISION OF PLANT INSPECTION

Rule and Regulation of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii Concerning the Importation into the Territory of Hawaii of Potatoes and Apples from Pacific Coast Ports.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rules and regulations for the purpose of preventing the introduction into this Territory from Pacific Coast ports of the United States of insect pests and plant diseases which may be carried on potatoes and apples.

Section 1. No shipment of potatoes or apples in the natural or raw state, whether by freight or express, shall be permitted to be imported into the Territory of Hawaii from ports on the Pacific Coast of the United States of America unless such shipment is accompanied by a certificate signed by a qualified officer of the city, county, or state from which the shipment is made, that the shipment has been inspected by him and is shipped free from insect pests and plant diseases.

Section 2. The certificate of inspection required by Section I must give the name of the shipper, the name of the consignee and the number of sacks, crates or boxes contained in each shipment of potatoes or apples and one copy must be attached to a sack, crate, or box in each shipment and another copy delivered to the Chief Plant Inspector or his assistant by the person, firm or corporation transporting such potatoes or apples, upon the arrival of the shipment in the Territory.

Section 3. No person, firm or corporation engaged in the transportation of freight or express packages between the said Pacific Coast ports and the ports of Hawaii, shall land or cause or allow to be landed in any port or on any wharf in the Territory of Hawaii, any such shipment of potatoes or apples in the natural or raw state without first delivering the certificate of inspection, provided for in Section 2, hereof, to the said Chief Plant Inspector or his assistant.

Section 4. Any shipment of potatoes or apples arriving in the Territory unaccompanied by said certificate of inspection will be returned to the consignor at his own expense.

Section 5. Any person, firm or corporation violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars ($500.00) as provided by Section 529 of the Revised Laws of Hawaii of 1915.

Section 6. This rule shall take effect on July 1, 1920.

Approved this 26th day of May, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

APPENDIX NO. 24

FEDERAL HORTICULTURAL BOARD, NOTICES OF QUARANTINE 1919-1920

Notice of Quarantine No. 37:

Pertaining to nursery stock, plants and seeds, as amended with regulations (effective on and after June 1, 1919, prohibits the importation of nursery stock and other plants and seeds from all foreign countries and localities, on account of certain injurious insects and fungous diseases, except as provided in the regulations. Under this quarantine the following plants and plant products may be imported without restriction: Fruits, vegetables, cereals, and other plant products imported for medicinal, food, or manufacturing purposes, and field, vegetable and flower seeds. The entry of the following plants is permitted under permit: lily bulbs, lily of the valley, narcissus, hyacinths, tulips, and crocus; stocks, cuttings, scions and buds of fruits; rose stocks, including manetti, multiflora, brier rose, and rosa rugosa; nuts including palm seeds; seeds of fruit, forest, ornamental, and shade trees; seeds of deciduous and evergreen ornamental shrubs, and seeds of hardy perennial plants.

Provision is also made for the issuance of special permits under safeguards to be prescribed in such permits for the entry in limited quantities of nursery stock and other plants and seeds not covered in the preceding lists for the purpose of keeping the country supplied with new varieties and necessary propagating stock.

This notice is the most important one and by its regulations all shipments of plants, cuttings, and seeds are under perfect control.

Notice of Quarantine No. 38:

Pertaining to black stem rust, prohibits the movement interstate to any point outside of the quarantined area of the common barberry and its horticultural varieties, as well as certain other species of *Berberis* and *Mahonia*, on account of the black stem rust of wheat, oats, barley, rye, and many wild and cultivated grasses.

Notice of Quarantine No. 39:

Pertaining to flag smut and take-all with regulations; prohibits the importation of seed or paddy rice from Australia, India, Japan, Italy,

France, Germany, Belgium, Great Britain, Ireland, and Brazil on account of two dangerous plant diseases known as flag smut (*Urocystis tritici*) and take-all (*Ophiobolus graminis*). Wheat, oats, barley, and rye may be imported from the countries named only under permit and upon compliance with the conditions prescribed in the regulations of the Secretary of Agriculture.

Under this notice we have seized and condemned and refused entry a large number of packages of rice, barley, wheat and oats.

Notice of Quarantine No. 40:

Pertaining to the green Japanese beetle recently found in the eastern United States, regulates the movement interstate to any point outside the townships of Delran, Chester, Cinnaminson, Palmyra, Mount Laurel, and Riverside, and the borough of Riverton, county of Burlington, and the townships of Pensauken and Delaware, and the borough of Merchantville, County of Camden, N. J., of (1) farm, garden, and orchard products of all kinds; (2) grain and forage crops of all kinds; (3) nursery, ornamental, and greenhouse stock, and all other plants, including bulbs and cut flowers; and (4) soil, compost, and manure other than fresh manure, on account of the Japanese beetle *(Popillia japonica)*.

Notice of Quarantine No. 41:

Pertaining to the European corn borer with regulations; prohibits the importation of the stalk and all other parts, whether used for packing or other purposes, in the raw or manufactured state, of Indian corn or maize, broom corn, sweet sorghums, grain sorghums, Sudan grass, Johnson grass, sugar cane, pearl millet, napier grass, teosinte and Job's tears, from all foreign countries and localities, except as provided in the rules and regulations supplemental thereto, on account of the European corn borer *(Pyrausta nubilalis)* and other dangerous insects and plant diseases.

Notice of Quarantine No. 42:

Pertaining to Mexican corn with regulations, prohibits the importation of Indian corn or maize from Mexico, except as provided in the rules and regulations supplemental thereto, on account of the contamination of such corn with cotton seed more or less infested with the pink bollworm.

Notice of Quarantine No. 43:

Pertaining to the European corn borer, as amended, regulates the movement interstate to any point outside of the quarantined area of corn and broom corn (including all parts of the stalk), celery, green beans in the pod, beets with tops, spinach, rhubarb, oat and rye straw as such or when used as packing, cut flowers or entire plants of chrysanthemum, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia, except the bulbs thereof, without stems, on account of the European corn borer *(Pyrausta nubilalis)*.

Notice of Quarantine No. 44:

Pertaining to stocks, cuttings, scions and buds of fruits, prohibits the importation of stocks, cuttings, scions, and buds of fruits for or capable of propagation from Asia, Japan, Philippine Islands, and Oceanica (including Australia and New Zealand), on account of certain dangerous plant diseases and insect pests. Provision is made for the im-

portation under special permits issued by the Secretary of Agriculture of limited quantities of stocks, cuttings, scions, and buds of fruits from the localities and countries enumerated for the purpose of keeping the country supplied with new varieties and necessary propagating stock.

Notice of Quarantine No. 45:

Pertaining to the gipsy and brown-tail moth, regulates the movement interstate to any point outside of the quarantined towns and territory, or from points in the generally infested area to points in the lightly infested area, of stone or quarry products, and of the plants and plant products listed therein. The quarantine covers all the New England States.

Notice of Quarantine No. 46:

Pertaining to the pink bollworm, prohibits the interstate movement from the infested and regulated areas of Texas and Louisiana of cotton, including all parts of the plant, seed cotton, cotton lint, linters, gin waste, and all other forms of cotton lint, cotton seed, cottonseed hulls, cottonseed cake and meal, bagging and other containers of the articles enumerated, and also railway cars, boats, and other vehicles which have been used in conveying cotton and cotton products grown in the infested districts or which are fouled with such products, hay and other farm products, farm household goods, and farm equipment, except as provided in the rules and regulations supplemental thereto, on account of the pink bollworm of cotton (*Pectinophora gossypiella* Saunders).

Notice of Quarantine No. 47:

Pertaining to Hawaiian and Porto Rican cotton, cotton seed and cotton products with regulations, prohibits the movement of these products from Hawaii and Porto Rico into or through any other Territory, State, or District of the United States.

Notice of Quarantine No. 48:

Pertaining to the green Japanese beetle with regulations, prohibits the movement of all garden, farm, and orchard products of all kinds, grain and forage crops of all kinds, nursery stock and greenhouse stock, soil, compost, manure other than fresh manure, from the infested area interstate in manner or method other than prescribed in the regulations.

Division of Animal Industry

LETTER OF SUBMITTAL

Honolulu, Hawaii,
December 31, 1920.

Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I have the honor to submit herewith a report covering the work of the Division of Animal Industry for the period from January 1, 1919, to December 31, 1920.

Respectfully submitted,

LEONARD N. CASE,
Territorial Veterinarian.

REPORT OF THE TERRITORIAL VETERINARIAN

By Leonard N. Case D. V. M. (Cornell), Superintendent of Animal Industry, Territorial Veterinarian, B. A. I. Inspector in Charge of Tuberculosis Eradication.

INTRODUCTION

The work of the Division of Animal Industry has during the past two years been devoted mainly to the control and eradication of infectious and contagious diseases of live stock within the Territory and to preventing the introduction of animal diseases from abroad through importation.

In general, conditions have been favorable to the continued prosperity and advancement of the live stock industry of the Territory. Animal diseases have not been of a very serious nature, the efforts of the Division being principally directed against hemorrhagic septicemia of cattle and swine, a number of outbreaks of which have occurred on the various islands. The losses attending these outbreaks have been kept within as reasonable limits as could be expected due to prompt measures of control and vaccination. The Division has been materially aided in this work through the establishment of a revolving fund, Act 85, by the last Legislature enabling us to keep on hand large amounts of the various biologics necessary in the effective control and eradication of infectious and contagious diseases.

Contagious abortion of cattle has recently made its appearance in this Territory, being first reported officially from the island of Maui. This disease with its attendant sequelae is at present causing more loss to live stock owners and breeders than any other one disease. In prominence it is overshadowing tuberculosis and measures for its control must necessarily occupy a large part of the work of this Division during the coming years. Before complete eradication can be hoped for regulations preventing its introduction from abroad must be promulgated.

The live stock industry of the Territory is no longer menaced by anthrax, as this disease has been entirely eradicated on Oahu and Maui and is under complete control on Kauai. This is a record hardly to be duplicated anywhere else in the world. The swine industry cannot be said to be menaced by hog cholera, the last authentic case of this disease occurring in 1914.

Taking it all in all, the live stock industry in general has not suffered any serious setbacks from outbreaks of infectious and contagious diseases during the two years.

Under authority of Act 204 of the Session Laws of 1919, this Division has tested for bovine tuberculosis 12,089 cattle in 1,260 dairies, of which number 428 were condemned, slaughtered and compensated for by the Territory. The compensation received by the owners was somewhat higher than in 1917-1918 due to the increased market value of dairy cattle and the more liberal limits of indemnification allowed by the 1919 law. As a consequence the appropriation allowed was exhausted sooner than was expected and it became necessary to appropriate more money to carry on this work.

In general the law has given satisfaction and considerable reduction in the amount of tuberculosis has been accomplished under it. There are, however, certain amendments which, in the light of experience, are considered necessary to increase its efficiency and to conserve as much as possible the appropriation. These amendments have been taken up and a bill incorporating them will be presented to the coming Legislature. The usual appropriation of twenty thousand dollars ($20,000.00) will be asked for which will furnish the means to carry out a program of extension about to be inaugurated.

IMPROVEMENT OF LIVE STOCK.

The steady improvement in live stock breeding, which has been noted in previous years, has increased in scope and volume during the period under review. Larger and more varied importations of pure-bred breeding stock have occurred than ever before and all indications point to a further increase during the next few years. While every class of live stock has felt the effect of this influx of new blood, the various breeds of cattle, especially dairy cattle, have been most affected.

Two factors have been mainly incidental in bringing this about, first, stimulating competition in exhibitions at live stock fairs and, second, the social welfare work being carried on throughout the Territory on the various plantations. These two factors will continue to operate until the live stock industry of this Territory is placed on a plane excelled in no other country. The climatic conditions are right and it only means that the right kind of care and feed be given the stock, especially imported stock, to have improvement rapid, steady and without setbacks.

IMPORTATIONS OF LIVE STOCK.

During the last biennial period a considerable number of high

class breeding stock have been imported. Importations of this kind are increasing in number with every year and well illustrates the trend of opinion among the stock breeders of the Territory.

The following classes of live stock have been received at the ports of Honolulu and Hilo during the years 1919-1920.

1919.

Port	Horses	Mules	Cattle	Sheep	Goats	Swine	Dogs	Cats	Poultry	
Honolulu ...	218	316	114	50	0	11	51	2	515	cts.
Hilo	0	27	18	0	0	0	0	0	39	"

1920.

Honolulu	88	530	243	0	129	467	88	8	1476	"
Hilo	33	140	71	0	11	13	0	0	42	"
Grand Total..	339	1013	446	50	140	491	139	10	2072	"

Horses.

There was a slight increase in the number of horses imported during the last biennial period. A large part of these were consigned to the U. S. Army and the various plantations. There were, however, a number of polo ponies and good type brood mares imported for different ranches.

Mules.

The importations of mules has increased considerably during the last two years. These shipments consisted of superior type plantation work animals.

Cattle.

The importations of cattle totaled about the same as for 1917-1918. The breeds represented were Hereford, Shorthorn, Jersey and Ayrshire. The last mentioned breed was well represented by two importations of high class pure-bred registered breeding stock and constituted the finest individuals imported here in many years. The Holsteins were ably represented by an importation for the Parker Ranch, consisting of some of the finest specimens of the breed ever brought to this Territory.

Sheep.

Importations in this class were confined to one shipment of pure-bred Merino rams from New Zealand for the Parker Ranch.

Goats.

Importations totalling 129 head, consisting mainly of pure-bred registered Toggenburgs, were received during 1920. This is the first time goats of this breed and in such numbers have been brought to these islands. Imported with the double idea of alleviating the shortage of milk and of placing a supply of nourishing food within the reach of the poorer classes, especially in plantation camps, they will furnish the nucleus of a new industry which should be given every encouragement and support. Milk from these highly-bred goats when drawn with due regard to cleanliness compares very favorably, with that from the best cows, in flavor and nourishment and certainly can be produced at a much cheaper figure.

Swine.

An unusually large number of swine were imported during the last two years, due to the fact that a large number of butcher hogs, 441 in number, were brought in to supply the local demand. This is the first time shipments of this class of hogs have arrived here since 1910. The remaining importations consisted of registered breeding stock for the continued improvement of the present herds.

Dogs.

An increasingly large number of dogs of various breeds and of no breed have been imported in the last two years, a larger number in fact than at any time since 1914, and this in spite of the four months' quarantine. It is expected that the reduction of the quarantine period through vaccination of all dogs with anti-rabic vaccine will tend to greatly increase these importations.

Poultry.

There has been a considerable increase in the number of crates of poultry received during the last two years, the greater number of these being brought down to supply market demands. Considerable numbers have also been imported for egg production and breeding purposes. The poultry industry is still far behind what it should be and it is to be hoped that more interest will be taken in this profitable business in the next few years.

DISEASES OF LIVE STOCK.

Bovine Tuberculosis.

A notable decrease has been made in the amount of tuberculosis in the dairy herds of the Territory during the biennial period under review. The percentage of tuberculosis was considerably

higher in 1919 than in the previous year, but this was due to the wider scope of the work under the new law which allowed the testing of herds other than strictly dairy herds, among which were herds long known to be infected with tuberculosis and forming centers of infection from which the disease was constantly being spread to other cattle.

In 1920 the percentage again dropped and to the lowest point it has been since 1914. The number of animals condemned, 131, taken in connection with the total number tested, is the lowest since 1911 and the percentage of tuberculosis at the end of the first six months of 1920, i. e. 1.2% is the lowest ever recorded in a like length of time in the history of tuberculosis eradication work in this Territory.

LEGISLATION AIDING THE CONTROL AND ERADICATION OF BOVINE TUBERCULOSIS.

Rule V.—Cattle for Breeding and Dairy Purposes—of the "Rules and Regulations Governing the Importation of Live Stock and Other Animals into the Territory of Hawaii," became effective in June, 1918. It is unnecessary to recount the provisions of this rule as they are given in full in the biennial report for 1917-1918. Its object was the quarantining and retesting upon arrival of all imported cattle unless said cattle came from tuberculosis-free herds accredited as such by state and federal officials.

Since this rule became effective 546 head of cattle, mostly pure-bred registered breeding stock, have been tested at the various quarantine stations. Of this number three grade cows and one registered bull failed to pass the retest and were condemned, all showing distinct lesions of tuberculosis on post-mortem examination. Had such a law not been in effect these three cows would have been placed in a dairy free from tuberculosis and the bull would have become the herd bull in a dairy of high priced registered holstein cows, thus forming two new centers of infection and entailing considerable expense to the Territory in indemnifications. As it was, the diseased animals were detected before admission without any expense attached thereto.

In the routine work of testing the dairies on Oahu there have been condemned from time to time animals which have but recently arrived from the outlying fields. Special reference is made of a shipment of three cows purchased for a local dairy and coming from South Kona. All three of these cows were condemned on the tuberculin test shortly afterward and when butchered were found to be badly affected with tuberculosis, one being so badly diseased that the entire carcass had to be condemned as unfit for food. This was an unfortunate circumstance as these cattle entered a dairy which had been free from disease for a considerable time, thereby reinfecting the premises and entailing a considerable financial loss to the owner.

In order to prevent a repetition of such shipments and to facilitate the eradication of tuberculosis on the various islands, it was recommended that the following regulation be promulgated prohibiting the shipment of dairy cattle from one island to another unless they came from clean herds or else had been tuberculin tested previous to shipment and to arrange for the quarantine and retest of such cattle when not so tested or when coming from herds known to be tuberculous. This regulation went into effect upon approval by the Governor on February 25, 1920.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY
RULE XIV—DIVISION OF ANIMAL INDUSTRY

Under authority of Section 503 of the Revised Laws of Hawaii, 1915, the Board of Commissioners of Agriculture and Forestry hereby issues the following regulation to prohibit inter-island shipment of dairy cattle affected with tuberculosis:

Section 1. No dairy cattle shall be shipped from one island to another unless accompanied by a permit issued by the territorial veterinarian, or his deputy, on blanks supplied by this Board.

Section 2. Such permit shall certify to the freedom from tuberculosis of the animals in question as proven by the tuberculin test within one week previous to shipment, or certify that the animals come from a herd which has passed the tuberculin test successfully twice within the preceding eighteen months.

Section 3. The territorial veterinarian, or his deputy, shall on request of the owner or shipper, issue a permit to ship untested but apparently healthy cattle in quarantine, such cattle to be kept segregated on premises approved by said officer at the point of destination until tuberculin tested and released by him.

Section 4. It shall be the duty of the owner or consignee to make sure that the said permit reaches the territorial veterinarian, or his deputy, before removal of the cattle from the wharf where landed, and the master, owner or agent of the vessel carrying such cattle shall not allow such removal until authorized by said officer.

Section 5. The territorial veterinarian, or his deputy, issuing such certificate shall furnish a copy of the same to the local agent or the master of the vessel accepting such shipment and shall mail or forward another copy without delay to the territorial veterinarian, or his deputy, at the place of destination.

Section 6. This rule shall take effect upon its approval by the Governor.

Approved this 25th day of February, 1920.

CURTIS P. IAUKEA,
Acting Governor of Hawaii.

Honolulu, T. H.

Since the above regulation went into effect 50 head of island cattle have been quarantined and retested with the result that one bull was condemned and found tuberculous on post-mortem examination, which well illustrates the value of this regulation.

INDEMNIFICATION FOR TUBERCULOUS CATTLE

The 1919 Legislature passed the following act for the indemnification of owners of condemned tuberculous cattle, thereby repealing Act 121 of the 1917 Legislature.

ACT 204

(S. B. No. 77)

AN ACT

To Prevent, Suppress and Eradicate Bovine Tuberculosis and to Provide for the Indemnification of Owners of Cattle Destroyed Under the Provisions of This Act, and to Repeal Act 121, Session Laws of 1917.

Be it Enacted by the Legislature of the Territory of Hawaii:

Bovine tuberculosis, a disease transmissible to human beings, and especially to children, through the consumption of milk from tuberculous cows, being prevalent in the Territory of Hawaii, the board of commissioners of agriculture and forestry is hereby authorized and empowered to take the following measures for the prompt prevention, suppression and eradication of bovine tuberculosis:

Section 1. All dairy cattle within this Territory more than six months old, and all cattle suspected of being affected with tuberculosis, shall be tuberculin-tested not oftener than once in six months, except in cases of herds having more than 15% tuberculosis at the last test in which cases more frequent tests may be made, and when found to be so affected either upon physical examination or by means of the tuberculin test the affected cattle shall be branded on the left cheek with the registerd brand "T R," and shall be appraised and slaughtered within a time and at a place designated by the territorial veterinarian, his assistant or deputy.

Section 2. Appraisal. The territorial veterinarian, his assistant or deputy, making the examination or test is hereby authorized, subject to approval by the board of commissioners of agriculture and forestry, to make an agreement with the owner as to the valuation of the animal or animals condemned. In case no agreement can be reached, the president of the board or his duly authorized agent shall choose one disinterested citizen, the owner another and the two so chosen shall designate a third, the three to act as a board of appraisers, who shall appraise such animal or animals and whose decision or the decision of a majority of which shall in all cases be final. All appraisals of cattle condemned under this Act, whether by agreement or by a board of appraisers, shall be based on the market value of such animal or animals on the day of appraisal. All appraisals shall be signed by the owner and the appraiser or appraisers, and shall be reported to the president of the board of agriculture and forestry. Compensation for appraisers appointed or selected pursuant to this Act shall not exceed five dollars per diem and their necessary traveling expenses. The compensation of the two selected appraisers shall be borne by the owner in case the board of appraisers fail to increase the valuation made by the territorial veterinarian, his assistant or deputy, with the approval of said board of commissioners. Otherwise the three appraisers shall be paid by the board of agriculture and forestry.

Section 3. Disposal of tuberculous animals. All cattle reacting to the tuberculin test shall immediately be segregated and arrangements shall be made for their slaughter within a reasonable time thereafter. Such slaughter and inspection shall be under the direct supervision of the territorial veterinarian, his assistant or deputy, and in accordance with the meat inspection regulations of the federal bureau of animal industry. The owner shall then sell those parts of the carcass which are found to be wholesome at the current market price for that class of meat and shall be indemnified as hereinafter provided for.

Section 4. Indemnification. The amount of indemnification shall be based upon the results of the post-mortem inspection as follows:

(a) If an animal is found upon post-mortem examination not to be affected with tuberculosis the owner shall be paid the full appraised value less the salvage of the carcass.

(b) If an animal is found upon post-mortem examination to be affected with tuberculosis and the lesions are such that the carcass and parts thereof are passed for food, the owner shall be paid 80 per cent of the appraised value, less the salvage of the carcass; except that the total indemnification hereunder shall in no case exceed the sum of three hundred fifty dollars ($350.00) for a pure bred, registered or entitled to registry animal, nor the sum of two hundred fifty dollars ($250.00) for a grade animal.

(c) If any animal is found upon post-mortem examination to be so extensively affected with tuberculosis as to be unfit for food the carcass and parts thereof shall be condemned for offal and the owner shall receive 50 per cent of the appraised value, less the salvage of the carcass, if any; except that such total indemnification shall not exceed the amounts set forth in paragraph (b) hereinabove.

The amount of indemnification being thus ascertained, the owner may present a claim upon the territorial treasurer therefor. The payment of such claim shall be made upon vouchers approved by the president of the board of agriculture and forestry and supported by the owners' and appraisers' report, the receipt for the amount of salvage, the inspector's report, on the presence or otherwise of tuberculous lesions and the disposition of the carcass with the date and place of slaughter, provided (a) that the owner shall receive no compensation unless the board shall be satisfied that the premises have been kept in a sanitary condition and that the owner has cooperated with the board and complied with its rules and regulations; and provided (b) that the board shall not certify to any claim for compensation until the infected premises have been disinfected, and sanitary and hygienic conditions are approved by said board after report by the territorial veterinarian, his assistant or deputy; and provided (c) that no payment shall be made for any imported animal which the board of agriculture and forestry has found necessary to quarantine and retest upon arrival, unless such animal has been in the Territory six months from the date of said retest, or unless such animal is found upon post-mortem examination not to be affected with tuberculosis.

In case of any report or ruling adverse to the owner hereunder, said owner shall be given a hearing before said board before a final ruling is made.

Section 5. The board of agriculture and forestry is hereby authorized to cooperate with the federal bureau of animal industry in its efforts to eradicate bovine tuberculosis or any other transmissible disease of animals.

Section 6. For the purpose of this Act, the sum of twenty thousand dollars ($20,000.00), in addition to any moneys now appropriated and available for this purpose, is hereby appropriated.

Section 7. Act 121, Session Laws of 1917, is hereby repealed.

Section 8. This Act shall take effect upon its approval.

Approved this 30th day of April, A. D. 1919.

C. J. McCARTHY,
Governor of the Territory of Hawaii.

This act was a considerable improvement over Act 121 in that it increased the scope of eradication work to include cattle outside of dairy herds in which there was any suspicion that tuberculosis existed and further that it increased the limits of indemnification to be paid to owners whose cattle were destroyed. The administration of the act has, however, indicated certain changes which will tend to increase its efficiency and will, when adopted, give this Territory the most liberal indemnification law ever written.

Since the above act went into effect there have been tested a total of 12,089 head of cattle out of which number 11,689 passed and 428 were condemned, branded and slaughtered, giving a percentage for the entire Territory of 3.54% which is the lowest ever recorded since systematic tuberculosis work embraced the entire Territory.

The cattle tested were divided as follows:

	Year	Total	Passed	Condemned	Percentage
Oahu	1919	3,420	3,194	226	6.60%
	1920	4,743	4,612	131	2.76%
Hawaii	1919-1920	2,245	2,225	48	2.13%
Maui	1919-1920	821	810	11	1.37%
Kauai	1919-1920	860	848	12	1.39%
Grand Total		12,089	11,689	428	3.54%

It can be seen from the above table that the Island of Oahu is the most heavily infected island in the group. However, it is entirely possible that the percentages of disease for the other islands will show an increase when the work is further developed and extended.

There are no statistics available as to the amount of tuberculosis on the islands of Lanai, Niihau and Molokai, as no testing has ever been done on these islands. The extension of tuberculosis control work to include this group is one of the new projects now under consideration.

TERRITORIAL INDEMNIFICATION.

The funds available for carrying on the tuberculosis eradication campaign at the beginning of the biennial period 1919-1920, amounted to $23,856.24 divided as follows:

Balance of 1917 appropriation	$ 3,856.24
Appropriation for Act 204	20,000.00
Total	$23,856.24

At the time this was considered ample to carry on this work during the biennial period but in the latter part of 1920 it became

apparent that, owing to the extension of the field work and the discovery of new centers of infection, together with other considerations already mentioned, the money would not carry through to the end of the fiscal year, June 30, 1921, so that it became necessary to ask the special session of the Legislature for an extra appropriation of $7,000.00, which sum was considered sufficient to carry on the work to July 1, 1921, at which time any money appropriated by the coming Legislature would become available. This amount was therefore appropriated bringing the total amount available for the purposes of tuberculosis eradication up to $30,856.24.

The total expenditures on account of tuberculosis eradication for the period 1919-1920 amounted to $29,256.09, distributed as follows:

Island	Appraised Value	Beef Value	Indemnification
Oahu	$51,290.00	$15,290.49	$25,997.95
Hawaii	3,080.00	1,784.93	1,422.34
Maui	2,325.00	790.82	1,066.67
Kauai	1,615.00	533.37	778.13
	$58,310.00	$18,399.61	$29,265.09

The above table gives the following averages:

Average appraised value	$136.23 per head
Average beef value	42.98 per head
Average indemnification	68.41 per head
Average value received by owner	111.39 per head

FEDERAL INDEMNIFICATION IN COOPERATIVE TUBERCULOSIS ERADICATION.

The enormous losses caused by bovine tuberculosis in the United States led to the formation of a new division in the Bureau of Animal Industry, known as the "Tuberculosis Eradication Division," Dr. J. A. Kiernan, Chief, for the purpose of organizing and systematising tuberculosis eradication work, popularising the tuberculin test of dairy and beef cattle and the establishment of tuberculosis-free accredited herds especially in pure-bred breeding stock.

For the purpose of carrying on the work of this division the following paragraph, in the federal agricultural appropriation bill, appears:

"'Extract from 'An Act Making Appropriations for the Department of Agriculture for the Fiscal Year Ending June Thirtieth, Nineteen Hundred Nineteen.' Approved October 1, 1918. (Public No. 219.)

"'For investigating the disease of tuberculosis of animals, for its control and eradication, for the tuberculin testing of animals, and for researches concerning the cause of the disease, its modes of spread, and method of treatment and prevention, including demonstrations, the for-

mation of organizations, and such other means as may be necessary, either independenly or in cooperation with farmers, associations, state or county authorities, $500,000. **Provided, however,** That in carrying out the purpose of this appropriation, if in the opinion of the Secretary of Agriculture, it shall be necessary to destroy tuberculous animals, and to compensate owners for loss thereof, he may, in his discretion, expend in the city of Washington or elsewhere out of the moneys of this appropriation such sums as he shall determine to be necessary for the reimbursement of owners of animals so destroyed, in cooperation with such states, counties or municipalities as shall by law or by suitable action in keeping with its authority in the manner, and by rules and regulations adopted and enforced in pursuance thereof, provide inspection of tuberculous animals and for compensation to owners of animals destroyed, but no part of the money hereby appropriated shall be used in compensating owners of such animals except in cooperation with and supplementary to payments to be made by state, county, or municipality, where destruction of such animals shall take place; nor shall any payment be made hereunder as compensation for or on account of any such animal destroyed if at the time of inspection or test of such animal or at the time of destruction thereof it shall belong to or be upon the premises of any person, firm, or corporation to which it has been sold, shipped or delivered for the purpose of being slaughtered: **Provided, further,** That out of the money hereby appropriated no payment as compensation for any tuberculous animal destroyed shall exceed one-third of the difference between the appraised value of such animal and the value of the salvage thereof; that no payment hereunder shall exceed the amount paid or to be paid by the state, county, or municipality where the animals shall be destroyed; and that in no case shall any payment hereunder be more than $25.00 for any grade animal or more than $50.00 for any pure-bred animal, and no payment shall be made unless the owner has complied with all lawful quarantine regulations."

Through an unfortunate oversight the word "Territory" was omitted in the indemnification clause of this bill thereby debarring this Territory from participating in this cooperative work to which we were justly entitled by many years of systematic work in the eradication of this disease. However, this omission was subsequently corrected by inserting the word "Territory" in several places in the 1919 Agricultural Appropriation Bill, approved by Congress on July 24, 1919.

This legislation gave the Bureau of Animal Industry the necessary authority to promulgate rules and regulations for the control and eradication of tuberculosis and enabled the Department of Agriculture to pay a small indemnity to owners of diseased animals.

Legislation, both statutory and regulatory, was the outcome of a realization on the part of department officials that if anything of a permanent character was to be accomplished in the eradication of bovine tuberculosis, the work must be of a systematic nature and that cattle owners must receive a reasonable indemnification for animals destroyed, if such work was to become at all popular. Desultory tuberculin testing had accomplished little or nothing; certain areas had been cleared up only to be reinfected

from outside districts and cattle owners had become disgusted with the methods employed and results attained through the incompetency of the men in charge.

Having demonstrated the feasibility and practicability of eradicating tuberculosis from certain circumscribed areas and gradually increasing these as funds permitted, the Bureau of Animal Industry inaugurated a campaign of tuberculosis eradication in cooperation with those states, territories, counties and municipalities which had by law and by rules and regulations adopted and enforced, provided for the inspection and testing of cattle and the indemnification of owners of cattle destroyed on account of being diseased. The main objects were to place the entire charge of tuberculosis control and eradication in the hands of state and federal officials who could be relied upon to carry out the work in a competent and efficient manner, to stimulate legislative action on the part of those states, territories, counties and municipalities which had so far failed to provide for the testing and inspection of cattle and the indemnification of owners of animals condemned and slaughtered, by offering to pay to such owners certain indemnities in cooperation with any local legislation which might be induced thereby, and to eliminate as far as possible all opposition on the part of cattle owners to the tuberculin test and slaughter of reacting animals by paying to such owners indemnities *in addition* to any indemnification paid or to be paid by states, territories or municipalities cooperating in this work.

To carry out this work the following regulations were promulgated:

(B. A. I. ORDER 267.)

UNITED STATES DEPARTMENT OF AGRICULTURE.

BUREAU OF ANIMAL INDUSTRY.

Regulations governing the appraisement of tuberculous cattle and expenditures on account of the control and eradication of tuberculosis of animals.

(Effective on and after September 1, 1919.)

UNITED STATES DEPARTMENT OF AGRICULTURE.

Office of the Secretary,
District of Columbia, August 6, 1919.

Under the authority conferred by law upon the Secretary of Agriculture the following regulations are hereby prescribed, to govern the slaughter of animals and expenditures on account of the control and

eradication of tuberculosis of animals, which for purposes of identification are designated as B. A. I. Order 267, and shall supersede B. A. I. Order 260, dated October 11, 1918.

These regulations shall become and be effective on and after September 1, 1919.

(Seal.) D. F. HOUSTON,
Secretary.

REGULATION 1—DEFINITIONS.

For the purpose of these regulations the following words, names, and terms shall be construed, respectively, to mean:

Section 1. The Department: The United States Department of Agriculture.

Section 2. The Secretary: The Secretary of Agriculture of the United States.

Section 3. The bureau: The Bureau of Animal Industry of the United States Department of Agriculture.

Section 4. Disease: Tuberculosis of cattle.

Section 5. Bureau employes: Inspectors and all other individuals employed in the bureau who are authorized by the chief of bureau to do any work or perform any duty in connection with the arrest and eradication of diseases of cattle.

REGULATION 2—COOPERATION WITH STATES, TERRITORIES, COUNTIES, AND MUNICIPALITIES.

Upon determination by the Secretary of Agriculture of the existence of tuberculosis in any State, Territory, county, or municipality, the chief of bureau will invite the proper authorities of such State, Territory, county, or municipality to cooperate with the department in the control and eradication of such disease.

REGULATION 3—COOPERATIVE AGREEMENTS.

Section 1. If it appears to be necessary for the control or eradication of tuberculosis of animals, to destroy animals affected by that disease, and to compensate owners for loss thereof, the chief of bureau is authorized within his discretion to agree, on the part of the department, with the State, Territory, county, or municipality to pay one-third of the difference between the appraised value of each animal so destroyed and the value of the salvage thereof: **Provided, however,** That in no case shall any payment by the department be more than $25 for any grade animal, nor more than $50 for any pure-bred animal.

Section 2. No payment by the department shall exceed the amount paid or to be paid by the State, Territory, county, or municipality where the animal shall be condemned.

REGULATION 4—APPRAISAL OF ANIMALS.

Section 1. Animals affected with tuberculosis shall be appraised by a representative of the bureau and a representative of the State, Territory, county, or municipality jointly. If the representative of the department and the representative of the State, Territory, county, or municipality shall disagree as to the amount of the appraisal, or if

the owner refuses to accept the appraised value, the animals shall be appraised in accordance with the laws and regulations of the State or Territory in which the animals are condemned.

Section 2. Bureau inspectors in charge of the work of eradication of tuberculosis in any State or Territory or in any part thereof may act as appraisers of animals and may detail competent bureau employes under their direction to act as appraisers.

Section 3. In the appraisal of tuberculous cattle due consideration shall be given to their breeding value as well as to their dairy or meat value.

Section 4. Appraisals of animals shall be reported on forms furnished by the bureau (T. E. Form 23 Revised). Reports of appraisals shall show the number of animals, the value of each per head, and shall be signed by the owner and the appraiser or appraisers and approved by the bureau inspector in charge. The T. E. Form 23 (Revised) shall show the amount paid or to be paid by the State, Territory, county, or municipality for said animals, and it shall be signed by a duly authorized official of the State, Territory, county, or municipality making partial payment for said animals. The T. E. Form 23 (Revised) shall be signed by the owner of the said animals certifying that the appraisal is accepted by him, and that the amounts due him from the United States and the State, Territory, county, or municipality are correct. One copy of T. E. Form 23 (Revised) shall be submitted to the bureau with the claim and one copy shall be retained by the bureau inspector in charge who approves the claim. Additional copies may be prepared and furnished to the State, Territory, county, or municipal officials if required. One copy may also be furnished the owner.

Section 5. The tuberculous cattle shall be slaughtered within 30 days of date of appraisal and a report of the salvage derived from the sale of such animals shall be made on the T. E. Form 24 signed by the purchaser or his agent. The salvage is the net amount received for the animal. Freight, yardage, commissions, slaughtering charges, etc., may be deducted, but any charges for holding the animals on the farm pending slaughter shall not be deducted, and any such charges will not be paid by the department. One copy of T. E. Form 24 shall be submitted to the bureau with the claim and one copy shall be retained by the bureau inspector in charge who approves the claim. Additional copies may be prepared and furnished to the State, Territorial, county, or municipal authorities, if required.

REGULATION 5—MORTGAGE AND OTHER LIENS.

When animals have been destroyed pursuant to these regulations, the inspector in charge shall take reasonable precautions to determine prior to his approval of vouchers in which compensation therefor is claimed, who is the owner of, and whether there are any mortgage or other liens outstanding against, the animals. If it appears that there are outstanding liens a full report regarding same shall be made and shall accompany the voucher. Every such report shall include a description of the liens, the name of the person or persons having possession of the documentary evidence thereof, and a statement showing what arrangements, if any, have been made to discharge the liens outstanding against the animals destroyed, of which the inspector in charge may have knowledge.

REGULATION 6—DISINFECTION.

Whenever necessary, in order to prevent the spread of tuberculosis, materials contaminated by, or exposed to, the disease, including barns,

stables, sheds, barnyards, lots, and other inclosures where diseased cattle were previously confined, shall be disinfected under supervision of a bureau or State employee.

REGULATION 7—EXPENSE OF DISINFECTION OF PREMISES AND CONVEYANCES.

Stockyards, pens, cars, vessels, and other premises and conveyances will be disinfected, whenever necessary for the eradication of tuberculosis, by the owners thereof at their expense, under the supervision of bureau or State employees.

REGULATION 8—CLAIMS NOT ALLOWED.

Section 1. No payment shall be made for any animals destroyed on account of tuberculosis unless the owner has complied with all lawful quarantine regulations, and unless the owner shall have executed the forms required by these regulations.

Section 2. The department will not allow claims arising out of the condemnation of cattle for tuberculosis on a tuberculin test applied by other than the bureau veterinary inspector, or a cooperating regularly employed State, Territorial, county, or municipal veterinary inspector.

Section 3. No compensation will be paid to owners of tuberculous animals except for animals in States, Territories, counties, or municipalities in which cooperative tuberculosis eradication work is being conducted.

Section 4. No compensation will be paid to any owner of tuberculous cattle whose entire herd is not under Federal and State supervision for the eradication of tuberculosis.

Section 5. No compensation will be paid to any owner for tuberculous cattle destroyed in any State, Territory, county, or municipality which does not by law or by suitable action in keeping with its authority in the matter, and by rules and regulations adopted and enforced in pursuance thereof, provide inspection of tuberculous animals and for compensation to owners of animals so destroyed.

Section 6. No payment shall be made for any animal or animals destroyed on account of tuberculosis except in cooperation with and supplementary to payments to be made by the State, Territory, county, or municipality.

Section 7. No claim for compensation for the destruction of cattle on account of tuberculosis shall hereafter be paid or allowed under the regulations contained in B. A. I. Order 237, dated March 19, 1915, but all such claims shall be presented and paid pursuant to and in compliance with the regulations contained in this order.

Extract from "An Act Making Appropriations for the Department of Agriculture for the Fiscal Year Ending June Thirtieth, Nineteen Hundred Twenty." Approved July 24, 1919. (Public No. 22.)

For investigating the disease of tuberculosis of animals, for its control and eradication, for the tuberculin testing of animals, and for researches concerning the cause of the disease, its modes of spread, and methods of treatment and prevention, including demonstrations, the formation of organizations, and such other means as may be necessary, either independently or in cooperation with farmers, associations, State, Territory, or county authorities, $1,500,000, of which $500,000 shall be set aside for administrative and operating expenses and $1,000,000 for the payment of indemnities: **Provided, however,** That in carrying out

the purpose of this appropriation, if in the opinion of the Secretary of Agriculture it shall be necessary to destroy tuberculous animals and to compensate owners for loss thereof, he may, in his discretion, and in accordance with such rules and regulations as he may prescribe, expend in the city of Washington or elsewhere out of the moneys of this appropriation, such sums as he shall determine to be necessary, within the limitations above provided, for the reimbursement of owners of animals so destroyed, in cooperation with such States, Territories, counties, or municipalities, as shall by law or by suitable action in keeping with its authority in the matter, and by rules and regulations adopted and enforced in pursuance thereof, provide inspection of tuberculous animals and for compensation to owners of animals so destroyed, but no part of the money hereby appropriated shall be used in compensating owners of such animals except in cooperation with and supplementary to payments to be made by State, Territory, county, or municipality where condemnation of such animals shall take place; nor shall any payment be made hereunder as compensation for or on account of any such animal destroyed if at the time of inspection or test of such animal or at the time of condemnation thereof, it shall belong to or be upon the premises of any person, firm, or corporation, to which it has been sold, shipped, or delivered for the purpose of being slaughtered: **Provided further,** That out of the money hereby appropriated, no payment as compensation for any tuberculous animal destroyed shall exceed one-third of the difference between the appraised value of such animal and the value of the salvage thereof; that no payment hereunder shall exceed the amount paid or to be paid by the State, Ttrritory, county, or municipality where the animal shall be condemned; and that in no case shall any payment hereunder be more than $25 for any grade animal or more than $50 for any pure-bred animal, and no payment shall be made unless the owner has complied with all lawful quarantine regulations.

In order to benefit from this federal appropriation, certain cooperative agreements have to be entered into by the United States Department of Agriculture, the Territory and the owner. The Territory must have laws and rules and regulations providing for the testing of cattle and indemnification of owners. These requirements have already been met in a manner satisfactory to the Federal Bureau of Animal Industry and are summed up in the following agreement:

> "Cooperative Agreement: The Bureau of Animal Industry of the United States Department of Agriculture and the Board of Commissioners of Agriculture and Forestry, Division of Animal Industry, for the purpose of improving the dairy and beef breeds of cattle in the Territory of Hawaii, encouraging recognition of the importance of maintaining such herds free from tuberculosis, and promoting the interchange of healthy pure-bred cattle, agree, so far as available funds permit, to cooperate in assisting breeders of such cattle to eradicate tuberculosis from their herds and to maintain officially Tuberculosis-free Accredited Herds."

For the owner to obtain federal indemnification, it is necessary that he agree, among other things, to the following stipulations:

1. To permit his herd, or any cattle of his herd, to be examined and to be tuberculin tested or retested at such times as are considered necessary by the Bureau or Territorial officials.

2. To cause all animals which show physical evidence of tuberculosis or which react to the tuberculin test to be promptly slaughtered under the United States meat inspection regulations and to cause the carcasses of said animals to be disposed of according to the meat inspection regulations of the Bureau of Animal Industry and the Territorial laws, based upon the lesions found upon post-mortem examination.

3. To allow no cattle to be associated with his herd which have not passed a tuberculin test approved by the Bureau or Territorial officials. To keep all new cattle separated from his herd, pending the application of a tuberculin test by said officials of the Bureau or Territory and to notify said officials immediately giving details of the identification, characteristics and records of tuberculin tests of any cattle which may be added to his herd.

4. To surrender any premises contaminated by tuberculous animals, as indicated by a physical examination or a tuberculin test, to a thorough cleaning and disinfection, at his expense, under the direction or supervision of the Bureau or Territorial officials and to comply with all sanitary measures and other recommendations for the control of tuberculosis.

With one or two exceptions the cattle owners of the Territory have complied with the above stipulations and in consequence have benefitted by federal cooperation. In a short time now this Division will be in a position to list a large number of herds throughout the Territory as being tuberculosis-free accredited herds.

A tuberculosis-free accredited herd is one which has been tuberculin tested by a method approved by the Bureau or Territorial officials. Further, it shall be a herd in which no animal affected with tuberculosis has been found upon two annual or three semi-annual tuberculin tests, as above described, and by physical examination. No herd shall be classified as an accredited herd in which tuberculosis has been found by the application of the tuberculin test, as above referred to, until such herd has been successfully subjected to two consecutive tests with tuberculin, applied at intervals of not less than six months, the first interval dating from the time of removal of the tuberculous animal or animals from the herd.

The advantages to be gained from this cooperative work and the establishment of tuberculosis-free herds are many. Cattle from such herds may be shipped interstate without further tests for a period of one year. Owners cooperating with the various departments toward the establishment of clean herds receive a higher indemnification for their condemned animals. Such owners are also in a position to advertise their herds as free from tuberculosis, thereby enhancing the value of their animals and increasing their sales.

In the latter part of last year the writer was appointed an

inspector in the Federal Bureau of Animal Industry, said appointment to take effect October 1, 1920. This appointment was made in order to facilitate cooperative tuberculosis eradication work in the Territory in that the Bureau had its own representative at appraisals of condemned cattle; for the signing of official documents pertaining to indemnification claims and to see that all regulations and quarantine laws were lived up to.

Cooperative tuberculosis work started in this Territory on July 24, 1919. Since going into effect fourty-eight claims totalling $6159.20 have been presented to the federal government for payment, a large number of which have already been paid. This has been of considerable help to the dairymen, who need every assistance in this rather precarious and unprofitable business.

ANTHRAX.

Little or no trouble has been experienced from this disease during the last biennial period. Completely eradicated from Oahu and Maui, it is under complete control on Kauai, the last death occurring in March of 1919.

No cattle have died on the Hanalei Ranch from anthrax since August, 1917. Between this date and March, 1919, only one death, a mule, occurring in May, 1918, has been recorded. This is a record made possible only through frequent vaccinations and the constant application of up-to-date methods of control.

The present status of the disease on Kauai seems to warrant a reduction in the amount of vaccination and in the future such vaccination is to be recommended for unvaccinated stock only, thereby confining it to that part of the annual calf crop which has reached the proper age. Also methods will be adopted to ascertain, if possible, the amount of infection remaining in the various paddocks and pastures.

HEMORRHAGIC SEPTICEMIA.

Characterization: Hemorrhagic septicemia is mostly an acute, less frequently subacute, infectious disease occurring mostly in cattle, but has been described in other ruminants, horses and mules. Its course is manifested by high fever, accompanied by acute gastro-enteritis, inflammatory edema of the skin and frequently necrotic pneumonia associated with gelatinous changes in the interalveolar connective tissue. Hemorrhagic areas of various size are more or less widely distributed throughout the body. The causative agent is the *Bacterium bovisepticum.*

Symptoms: In the beginning of an outbreak the disease takes a very rapid course. Often animals are found dead before anything is noticed to be wrong with them.

The period of incubation of the disease in inoculation and feeding experiments has been proven to be from six to twenty-four hours. In natural infections it is probably somewhat longer, but it hardly ever extends over two days.

The first observable symptom is a rise in temperature. The affected animal shows a disinclination to move about, standing in one place with arched back and low hanging head. The eyes have a sunken, strained appearance and the coat is rough, and muscular tremblings are noticeable.

In the early stages constipation may be noticed but this is soon followed by fluid evacuations of a foul odor not infrequently mixed with bloody mucous. Painful swellings about the legs, shoulders, neck and throat may be observed and the dark and swollen tongue may protrude from the mouth interfering considerably with mastication and degulition.

Bloody exudates from the nose and anus are frequently observed in animals dead of the disease resembling somewhat, in this respect, cases of anthrax.

Anatomical Changes: The anatomical changes found upon post-mortem examination vary considerably in different cases and in different outbreaks.

Autopsy usually reveals a marked hyperemia of the internal organs with numerous hemorrhages of various size in the serous and mucous membranes. The spleen may be normal in appearance or contain numerous hemorrhagic areas. It is rarely, if ever, enlarged.

In the edematous form of the disease the subcutaneous connective tissue of the head, throat region and neck show a gelatinous infiltration studded with hemorrhages. In certain cases the tongue appears more or less enlarged and of a dark, brownish-red color and firm consistency. The location of the superficial lesions varies in different cases. In many instances the shoulder and surrounding parts are most affected while in some cases the hind quarters are considerably involved. Removal of the skin almost always reveals hemorrhagic areas in the subcutaneous connective tissue. The muscle tissue itself is rarely involved to any extent, the changes noticed being almost entirely confined to the intra-muscular connective tissue.

The lymph glands throughout the body are generally enlarged, edematous and hemorrhagic and exude a blood-tinged, straw colored fluid upon incision. Both body cavities may contain large amounts of fluid of a similar character together with varying sized masses of gelatinous material. The intestines may contain a large amount of bloody exudate and the feces are usually covered with a bloody mucous.

Control: Hemorrhagic septicemia is considered by Hutyra

and many others as a disease of the soil, hence extensive measures restricting cattle traffic are unnecessary.

The natural infection occurs in most cases through the digestive tract; exceptionally the virus may enter the system through abrasions of the buccal mucous membranes or through wounds in the skin.

Hides as soon as they become dry cease to be a source of danger. The vitality of the organism becomes rapidly diminished after leaving the body of the host. After a certain time outbreaks which do not as a rule extend over large areas, usually subside very probably as a result of an attenuation of the virus which takes place in the meantime.

Hemorrhagic septicemia is not considered as one of the quarantinable diseases. A quarantine may be placed upon certain districts in the beginning of an outbreak and until vaccination is finished but because of the rapid death of the organism and its soil origin it is unnecessary to enforce rigid traffic restrictions.

Outbreaks of hemorrhagic septicemia have occurred in this Territory at intervals since 1909. The earlier outbreaks were confined to small areas and few animals were lost. In April of 1920, however, the disease broke out in a very virulent form among the cattle of the Kaalualu Ranch, Naalehu, Kau, on the island of Hawaii. This outbreak covered a considerable area and included homesteaders' cattle and plantation stock.

Vaccination was resorted to in control of the outbreak and a total of 4,934 plantation animals and 1,372 homesteaders' animals were vaccinated with the result that the total loss was confined to 160 head. The benefits of vaccination in outbreaks of this character are from the protection conferred upon exposed animals rather than the cure of animals already sick from the disease.

It cannot be expected even under the most favorable conditions that vaccination will immediately put a stop to all deaths in the infected area. Such deaths will occur from time to time until the virulency of the causative factor has diminished to such an extent that it is no longer capable of producing disease.

SWINE PLAGUE AND MIXED INFECTIONS.

Swine plague, the hemorrhagic septicemia of swine, has occurred with more or less frequency during the past two years on most of the islands of the group. Swine plague not infrequently occurs in an uncomplicated form and as such is capable of causing severe losses among hogs. The same general characterizations and post-mortem lesions pertain to this disease as were given for hemorrhagic septicemia of cattle.

This disease usually occurs, however, associated with hog cholera or the necrophorus baccilus in the so-called mixed infec-

tions of swine. It is in association with the last named organism that it has been most frequently observed in this Territory.

Vaccination has given splendid results in some localities while in others little or no improvement has been noticed. Poor results through vaccination may be expected when no attention is paid to sanitation. In many piggeries, especially those of the Orientals, it is more a problem of hygiene and sanitation than simple vaccination. Until the hygienic and sanitary surroundings of the animals have been improved as much as possible it is practically a waste of time, money and material to vaccinate and this pertains with equal force whether the disease in question be called swine plague, hog cholera or mixed infection.

HOG CHOLERA.

While it may be rather premature to say that hog cholera does not exist in this Territory, it is certain that no authentic cases of death among hogs due to the filterable virus have been reported in many years.

In the early history of this Division, hog cholera was encountered, but at no time did the outbreaks assume the character and virulence of the disease as occurring on the mainland.

Recently, however, our attention has been drawn to the question of the presence of hog cholera in these islands and steps will soon be taken to establish definitely the presence or absence of the filterable virus disease.

RABIES.

Rabies, although present in the Pacific Coast States since the early part of 1912 and reported at the present time as increasing at an alarming rate, has never been observed in this Territory and the efficient quarantine maintained here is sufficient assurance that it never will make its appearance here.

The four-month quarantine period which became effective in March, 1912, and which has so far afforded this Territory the most adequate protection against this most horrible disease of man and animals, has been and is a constant source of criticism from owners of imported dogs.

In all the criticism offered, there has been nothing of a constructive nature and, while it was fully realized that such criticism was based on ignorance and indifference, it was nevertheless annoying to the officials in whose hands the administration of this quarantine regulation was placed. It was, therefore, with a feeling of relief that our attention was directed to a method of vaccination against rabies which allowed of a considerable reduction in the quarantine period.

This method of vaccination, which is known as the Hoyges dilution method, consists of a series of hypodermic injections of a certain amount of a highly diluted but unattenuated virus at twenty-four hour intervals. Six injections constitute a full treatment and is followed by a thirty-day period of observation before release from quarantine. The treatment will protect an animal for a variable time against a subsequent exposure to the disease and is supposed to exert a curative influence in animals which have been but recently infected. It occupies about the same position in the treatment of animals as the Pasteur method does in the treatment of man.

A life immunity is not conferred by the vaccination. At best such an immunity does not extend beyond a two-year period and this period varies within wide limits, according to the individual and the breed. It is, therefore, not safe to rely for any great length of time on the immunity produced, consequently all dogs leaving the Territory must be submitted for treatment and quarantine upon their return whether they have been previously treated or not.

In order to allow the treatment of dogs arriving here and a consequent shortening of the quarantine period, Rule VIII—Dogs, was amended to read as follows:

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY

AMENDMENT TO RULE VIII—DIVISION OF ANIMAL INDUSTRY.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule VIII of the Division of Animal Industry to read as follows:

Rule VIII—Dogs. Sec. 1 (a). All dogs arriving in the Territory of Hawaii and coming from or through any country, state, or territory where rabies is known to exist, shall be kept in quarantine on premises provided by this Board for a period of one hundred and twenty (120) days counting from the date of embarkation, or may be vaccinated against rabies and held for observation for thirty (30) days after the last injection.

Sec. 1 (b). The above amendment shall take effect upon approval by the Governor.

Approved this sixth day of November, 1920.
Honolulu, T. H.

C. J. McCARTHY,
Governor of Hawaii.

Since the above amendment went into effect, fourty-four (44) dogs have received the anti-rabies treatment and so far no untoward symptoms have developed in any.

GLANDERS.

While it cannot be said that the Territory as a whole is entirely free from glanders it is, however, certain that this disease has ceased to be a menace to the live stock industry.

Glanders has never existed on the islands of Kauai, Niihau, Lanai and Molokai and has been entirely eradicated from Oahu, Maui and the larger part of Hawaii. From the districts of Hamakua and Kohala, Island of Hawaii, cases of glanders are reported from time to time. The valleys and gulches of these two districts appear to be the last stronghold of this disease in the Territory.

The last large outbreak of glanders occurred in Waipio Valley in 1912 and since then cases have been reported from time to time. In North Kohala a number of cases were diagnosed and disposed of in 1916. Since that time only two cases have been reported, one in a mule occurring in 1919 and one in a mule during the middle of 1920.

In order to rid these districts from glanders and incidentally be in a position to report this Territory as being entirely free from this disease, it will be necessary to institute a complete and rigid inspection of all horse stock existing in this part of the Island of Hawaii and to this end it will be necessary to render assistance from this office to the deputy stationed in Kohala.

CONTAGIOUS ABORTION.

This is a contagious disease of cattle, though other breeds may become affected, observed especially in breeding establishments and dairies, although it may become widely spread among range cattle, the causative factor of which is, in the majority of cases, the bacillus abortus (Bang).

This disease, which has been recorded from very early times, is assuming considerable economic importance in the live stock industry of the country and is at the present time attracting wide-spread interest among veterinary sanitarians. It undoubtedly causes more loss to the stock breeder than any other infectious and contagious disease of cattle.

Existing on the mainland of the United States for many years, it was only recently discovered among the cattle of this Territory, although there is reason to believe that it has been present here for a considerable time among the dairy cattle in certain districts and never reported.

Its introduction to these islands undoubtedly occurred through the importation from the mainland of cattle known as "carriers," that is, cattle which have aborted several times and finally recovered, but still able to spread the infection. At the present time it is practically impossible to guard against its introduction by means of such animals because of no satisfactory methods of inspection before shipment. It is, however, highly probable that regulations regarding the handling of imported cattle after arrival here with special reference to contagious diseases of the genital organs will be promulgated.

Contagious abortion is characterized by the expulsion of the uterine contents followed by a uterine discharge, retention of the afterbirth in many cases, though not always, and a more or less severe metritis. An animal may abort at any time during the gestation period from the second to the seventh month, the majority of cases occurring during the fourth and fifth months of pregnancy. If uncomplicated with any other disease the animal fully recovers. We have observed it here occurring with hemorrhagic septicemia causing the death of an animal in each case.

The loss from this disease is confined principally to the death of the offspring, reduction in milk production and the resulting sterility which, in many instances, follows a series of abortions.

Contagious abortion may persist for years in infected premises when proper measures for its prevention and suppression are not taken. In the beginning, after the first case, new cases may not appear for several weeks, then, however, abortions begin to occur more rapidly until finally normal births occur only exceptionally. After a time the disease dies down, abortions occurring only rarely, the majority of animals giving birth to full time calves until a stage is reached where abortion occurs only in those animals which have been introduced from healthy herds.

After a herd has become infected, the separation of the apparently healthy animals which never have aborted, taking them to a place which is free from infection, is clearly indicated. If this cannot be accomplished, it is advisable to segregate the already infected and suspected animals in a separate stable or, if this is not possible, in isolated stalls in the same stable and supply special attendants for them. Thorough disinfection of the entire premises should be practiced, burning all contaminated litter, remnants of feed, fetal membranes and afterbirths which may be in evidence.

It is the apparent establishment of an immunity in animals affected with contagious abortion which has been

made the basis of the modern vaccine therapy in the control and eradication of this disease. At the present time two vaccines are on the market—one, a three-injection method for the protection of the pregnant animal, the treatment to be finished before the fourth month of pregnancy, and the other a single injection method for the immunization of virgin heifers and non-pregnant cows. Sufficient work has not been done with them to definitely establish their value, but their use in connection with a thorough cleaning and disinfection of the vagina and uterus appears to be the logical line of treatment. It is, however, only in herds where complete breeding records are kept that the best results will be obtained through vaccination.

GENERAL DISEASES OF LIVE STOCK.

Among the general diseases which occur more or less frequently among the live stock of the Territory may be mentioned cerebro-spinal meningitis in plantation work stock; canine distemper; canine mange of different forms; equine influenza, and contagious epithelioma and eye worm of poultry.

Several outbreaks of cerebro-spinal meningitis have occurred during the past two years among plantation animals, especially on Molokai, where a number of good animals have been lost. There seems to be little or nothing to be done in the way of treatment. Change of feed and location are the only two things indicated. Recently, however, a number of experiments have been tried with a polyvalent Botulinus vaccine which have been fairly successful, especially in the prevention of the disease.

Canine distemper has been unusually severe during the last two years and accompanied with a higher mortality than ever before, in spite of the most modern treatments employed. Prophylactic vaccination should be prescribed in the case of all young dogs whether there is a history of exposure to the disease or not. If such a line of procedure is regularly carried out canine distemper would soon cease to be a menace to the dog population of the Territory.

Canine mange in its various forms is a problem which has so far received little or no attention. These skin affections to which the canine species are very susceptible are the bane of the dog breeding industry of the islands and a source of discouragement to importers of fancy dogs.

Regulations should be promulgated and enforced leading to the apprehension and prompt destruction of all homeless, mangy dogs. By so doing, 90% of the source of infection

would be disposed of and the treatment of well bred dogs could then be undertaken with some hope of an eventual cure. Until such regulations are put in effect, control and eradication of the malady is practically hopeless.

Equine influenza has been assuming a considerable degree of importance and a number of outbreaks involving a considerable number of animals have been reported from Maui and Hawaii. Fortunately the total loss has been small, due to the up-to-date methods of control adopted by the deputy territorial veterinarians stationed on these two islands.

Dr. H. B. Elliott of Hilo reports an outbreak of equine influenza in a consignment of horses and mules arriving in Hilo from the Coast last November, which necessitated the vaccination and prolonging of the quarantine of these animals. Dr. Elliott suggests that this disease should be made the subject of definite regulation compelling notification, segregation and vaccination of affected animals and thorough disinfection of premises as a means for combatting outbreaks. There is a good deal in favor of this suggestion. Certain it is that at times this and allied diseases of horse stock assume alarming proportions and such regulations would be of material aid in confining the outbreaks to a limited area and reduce the mortality.

Poultry diseases during the period under review have been conspicuous by their absence. No epidemics of any nature have been reported. A few small outbreaks of contagious epithelioma have been reported, but the loss resulting has been small. No cases of eye worm have been brought to notice.

LEGISLATION AIDING THE CONTROL AND ERADICATION OF INFECTIOUS, CONTAGIOUS AND TRANSMISSIBLE DISEASES OF LIVE STOCK WITHIN THE TERRITORY.

The 1919 Legislature enacted the following important measures protecting the live stock industry of the Territory by providing a revolving fund for the control and suppression of animal diseases:

ACT 85

(S. B. No. 147)

AN ACT

To Provide a Revolving Fund for the Board of Agriculture and Forestry to Supply Preventive and Curative Serum, Vaccine, Bacterin and Other Remedies for the Control and Suppression of Transmissible Diseases among the Live Stock and Other Animals in the Territory of Hawaii.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. To provide a working capital for the purchase by the Board of agriculture and forestry of preventive and curative serum, vaccine, bacterin, and other remedies for the control and suppression of transmissible diseases among the live stock and other animals in the Territory of Hawaii, the sum of five thousand dollars ($5,000.00) is hereby appropriated from the general revenues of the Territory, to be immediately deposited with the treasury as a continuing deposit to be known as the "Animal Industry Revolving Fund."

Section 2. Withdrawals may be made from time to time from the animal industry revolving fund by the board of agriculture and forestry for the purchase of supplies of preventive and curative serum, vaccine, bacterin and other remedies for the control and suppression of infectious, contagious and transmissible diseases of live stock and other animals in this Territory, to be sold to the owners of affected live stock and other animals.

All withdrawals shall be upon warrants of the auditor of the Territory of Hawaii on vouchers, properly approved by the president or executive officer of the board of agriculture and forestry.

Section 3. The said board shall upon recommendation of the territorial veterinarian supply to the owners of such diseased animals such remedies at the actual cost thereof, and such remedies shall be administered by the territorial veterinarian, his assistant, or deputies whenever an outbreak of an infectious, contagious or transmissible disease of live stock and other animals may occur.

The said board shall have a lien upon the animals thus treated and may in its discretion invoke the aid of the proper judicial authority in collecting said cost.

Section 4. All receipts on account of withdrawals from the animal industry revolving fund, authorized by Section 2 of this Act, shall be deposited, with the treasurer of the Territory of Hawaii, to the credit of the animal industry revolving fund.

Section 5. This Act shall take effect upon its approval.

Approved this 15th day of April, A. D. 1919.

C. J. McCARTHY,
Governor of Hawaii.

The act appropriated the sum of $5,000.00 to be known as the "Animal Industry Revolving Fund" and provided for the purchase by the Board of supplies of preventive and curative serums, vaccines, bacterins and other remedies for the control and suppression of animal diseases which shall, upon the recommendation of the Territorial veterinarian, be furnished to

owners of diseased and exposed live stock at actual cost, the proceeds of such sales to be returned to said revolving fund by the Treasurer of the Territory.

The purpose of the act was to enable the Division of Animal Industry to keep on hand sufficient quantities of the above mentioned remedies to insure prompt action in any sudden outbreak of disease, thereby obviating the necessity for cabling for such supplies, the enforced waiting and the chances of an epidemic getting beyond control. As the act provides that these remedies "shall be administered by the territorial veterinarian, his assistant or deputies," it will in all cases be necessary for stock owners to have their diagnoses confirmed by one of these officers, who will then take prompt action in securing and applying the required remedy.

QUARANTINE STATIONS.

The present quarantine stations provided by the Board for the handling of imported live stock are rapidly becoming inadequate to the demands being made upon them by the increasing number of animals arriving in the Territory. The necessary repairs are so extensive as to mean practically reconstruction and this reconstruction should be of a permanent character.

The importance of the quarantine work of this Division cannot be overestimated. It stands as the guard against the advent of infectious or contagious diseases into this Territory. It acts as a filter for the live stock industry here in that it detects and eliminates disease in so far as such a thing is possible, and insures the admission of healthy animals only. Consequently every facility should be supplied if this is to be accomplished in a satisfactory manner and the stock owner and breeder receive the protection he is entitled to. The old adage, "An ounce of prevention is worth a pound of cure," can be very well applied in connection with this important work.